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Administrator's Guide

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Preface

Oracle Audit Vault Administrator's Guide explains how Oracle Audit Vault administrators can perform administrative tasks on an Oracle Audit Vault system. This guide assumes that you have completed the installation tasks covered in the *Oracle Audit Server Vault Installation Guide* and the *Oracle Audit Vault Collection Agent Installation Guide*.

Audience

This document is intended for anyone who is responsible for administering an Oracle Audit Vault system.

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Related Documents

For more information, see the following documents in the Oracle Audit Vault documentation set. See also the platform-specific Oracle Audit Vault Server installation guides.

- *Oracle Audit Vault Server Installation Guide for Linux x86*
- *Oracle Audit Vault Collection Agent Installation Guide*
- *Oracle Audit Vault Licensing Information*
- *Oracle Audit Vault Auditor's Guide*
- *Oracle Database Vault Administrator's Guide*
- *Oracle Database Security Guide*
- *Oracle Database Advanced Security Administrator's Guide*
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For OTN information specific to Oracle Audit Vault, visit

`http://www.oracle.com/technology/products/audit-vault/index.html`

For the Oracle Audit Vault Discussion Forums, visit

`http://forums.oracle.com/forums/forum.jspa?forumID=391`

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

1

Introducing Oracle Audit Vault for Administrators

This chapter contains:

- How Do Administrators Use Oracle Audit Vault?
- Components of Oracle Audit Vault
- Administrative Tools for Managing Oracle Audit Vault
- Administrative Roles and Their Assigned Tasks
- Planning the Source Database and Collector Configuration

1.1 How Do Administrators Use Oracle Audit Vault?

By the time you begin to use this guide, you will have installed Oracle Audit Vault and the databases (called source databases, or **audit data source**s) from which you want to extract audit data are ready to be audited. This guide explains how to configure the source databases so that Oracle Audit Vault can collect their audit data. After you have completed this configuration, auditors then are able to generate and customize reports that describe this audit data.

An Oracle Audit Vault administrator is responsible for the following tasks:

- Ensuring that the source databases have auditing enabled
- Understanding the type of auditing that each source databases uses
- Selecting the correct Oracle Audit Vault component, called a collector, to connect to the source database, based on the type of auditing that database uses
- Configuring this collector to connect Oracle Audit Vault to the source database
- Ensuring that the collectors are collecting audit data from the source database
- Managing the day-to-day activities of Oracle Audit Vault such as disk space and backup and recovery operations
- Managing security for Oracle Audit Vault
- Running the Oracle Database audit trail clean-up procedures, which purge audit trail records from the Oracle source database after these records are archived
- Monitoring Oracle Audit Vault to ensure that it is consistently collecting audit data

1.2 Components of Oracle Audit Vault

This section contains:

- Source Databases
- Oracle Audit Vault Server
- Audit Vault Collection Agent
- How the Oracle Audit Vault Components Work Together

1.2.1 Source Databases

A source database, also called an **audit data source**, is a database from which Oracle Audit Vault collects audit data. Oracle Audit Vault can collect this audit data from the internal audit trail tables and operating system audit trail files of a source database.

Table 1–1 lists the supported source database products.

Table 1–1 Supported Source Database Products

Database Product	Supported Versions
Oracle Database	Releases 9.2.*x*, 10.1.*x*, 10.2.*x*, and 11.*x* for the OSAUD and DBAUD collector types. Enterprise Edition Releases 9.2.0.8, 10.2.0.3 11.1.0.6, and 11.1.0.7 and higher for the REDO collector type.
Microsoft SQL Server	SQL Server 2000 and SQL Server 2005 on Windows 2000 Server and Windows 2003 Server (32 bit) platforms
Sybase Adaptive Server Enterprise (ASE)	ASE 12.5.4 and ASE 15.0.2 on Linux and UNIX-based platforms, and on Microsoft Windows platforms
IBM DB2	IBM DB2 Version 8.2 and Version 9.5 on Linux and UNIX-based platforms, and on Microsoft Windows platforms

1.2.2 Oracle Audit Vault Server

The Oracle Audit Vault Server contains the tools necessary to configure Oracle Audit Vault to collect audit data from your source databases. The Audit Vault Server also stores this audit data in a data warehouse.

The Audit Vault Server consists of:

- Audit Data Store
- Oracle Audit Vault Console
- The following services:
  - Collector management and monitoring
  - Report management
  - Alert management
  - Audit settings management to establish your policy management
  - Published data warehouse that can be used with reporting tools like Oracle Business Intelligence Publisher to create customized reports
  - Audit data collection and storage management

Configuration services assist in defining information about what the source databases are known to Oracle Audit Vault. Oracle Audit Vault stores information (metadata) about the sources of audit data and policy information (database audit settings).

Table 1–2 describes the Audit Vault Server components. See also Figure 1–2 on page 1-6 to understand how these components work together.

Table 1–2 Audit Vault Server Components

Components	Description
Oracle Container for Java (OC4J)	Oracle Database container for Web applications. It hosts the following components: ■ **Audit Vault Console.** User interface for administrators to administer Oracle Audit Vault. Oracle Audit Vault auditors also can use this interface to generate reports, create alerts, and create Oracle Database audit policies. ■ **Oracle Enterprise Manager Database Control console.** User interface to manage the raw audit data store or audit repository database ■ **Management Framework.** Internal tool that sends management commands to the Audit Vault Collection Agent to start or stop collection agents and collectors, collect metrics, receive management commands from the Oracle Audit Vault command-line tools using HTTP protocol or HTTPS mutual certificate-based authentication. Section 1.3 lists the Oracle Audit Vault command-line tools. ■ **Audit Policy System.** Internal service that retrieves and provisions audit settings on the Oracle Database source. It also enables users to create and manage alerts raised by audit events from all source databases as they are stored in the audit event repository.
Database Client	Infrastructure to communicate to the audit repository, consisting of: ■ **Oracle Wallet.** Contains credentials to authenticate Oracle Audit Vault users ■ **Configuration Files.** Files used by Oracle Audit Vault for networking, preferences, and so on.
Configuration and Management Tools	Utilities used to configure and manage Oracle Audit Vault, which are described in detail in Section 1.3. They let you define and configure information about what source databases are known to Oracle Audit Vault.
Logs	Informational and error messages for Oracle Audit Vault. See Section A.1 for more information.
Audit repository	Oracle database to consolidate and manage audit trail records, consisting of: ■ **Raw audit data store.** A partitioned table where audit records are inserted as rows ■ **Warehouse schema.** Open schema of normalized audit trail records. This is a published **data warehouse** that auditors can use with reporting tools such as Oracle Business Intelligence Publisher to create customized reports. ■ **Job scheduler.** Database jobs used to populate and manage the warehouse ■ **Alerts.** Queue that maintains auditor-created alerts

1.2.3 Audit Vault Collection Agent

A **collector** retrieves the audit trail data from a source database and sends it to the Audit Vault Server. The **collection agent** manages the collectors. The collectors send both valid and invalid audit records, get configuration information, and send error records using OCI/JDBC password-based authentication.

Table 1–3 lists the components of the collection agent. To understand how the collection agent fits in with the Oracle Audit Vault process flow, see Figure 1–2 on page 1-6.

Table 1–3 Audit Vault Collection Agent Components

Component	Description
OC4J	Oracle container for Web applications. It hosts the following components: ▪ **Audit Vault Collector Manager.** Receives management commands from the Audit Vault Server to start and stop collectors, collect and return metrics, and so on. ▪ **Audit Settings Manager.** Receives commands from Oracle Audit Vault to extract audit settings from an Oracle Database source.
Database Client	Infrastructure to communicate to the audit repository, consisting of: ▪ **Oracle Wallet.** Contains credentials to authenticate Audit Vault users ▪ **Configuration Files.** Files used by Audit Vault for networking, preferences, and so on.
Configuration and Management Tools	Utilities used to configure and manage Oracle Audit Vault. These are the `AVCA`, `AVCTL`, `AVORCLDB`, `AVMSSQLDB`, `AVSYBDB`, and `AVDB2DB` command-line utilities.
Logs	Informational and error messages for Oracle Audit Vault (see Section A.1)
Collectors	Table 1–4 shows the type of collectors deployed by the Oracle Audit Vault collection agents and the audit trail from which audit records are extracted and collected.

Table 1–4 lists the types of collectors.

Table 1–4 Audit Vault Supported Collector Types by Audit Source and Audit Trail

Audit Source	Collector Type	Audit Trail
Oracle Database	DBAUD	Collects from the following audit trails: ▪ Oracle Database audit trail, where standard audit events are written to the `SYS.AUD$` dictionary table ▪ Oracle Database fine-grained audit trail, where audit events are written to the `SYS.FGA_LOG$` dictionary table ▪ Oracle Database Vault audit trail, where audit events are written to the `DVSYS.AUDIT_TRAIL$` dictionary table
Oracle Database	OSAUD	Collects from the following audit trails: ▪ On Linux and UNIX platforms: the operating system logs (audit logs) (`SYS$AUD`) (`.aud`) and XML (`.xml`) files) ▪ On Linux and UNIX-based platforms, the operating system logs or syslog ▪ On Windows platforms, the operating system Windows event log and operating system logs (audit logs) XML (`.xml`) files
Oracle Database	REDO	Logical change records (LCRs) from the REDO logs
Microsoft SQL Server	MSSQLDB	C2 audit logs, server-side trace logs, and Windows Event log

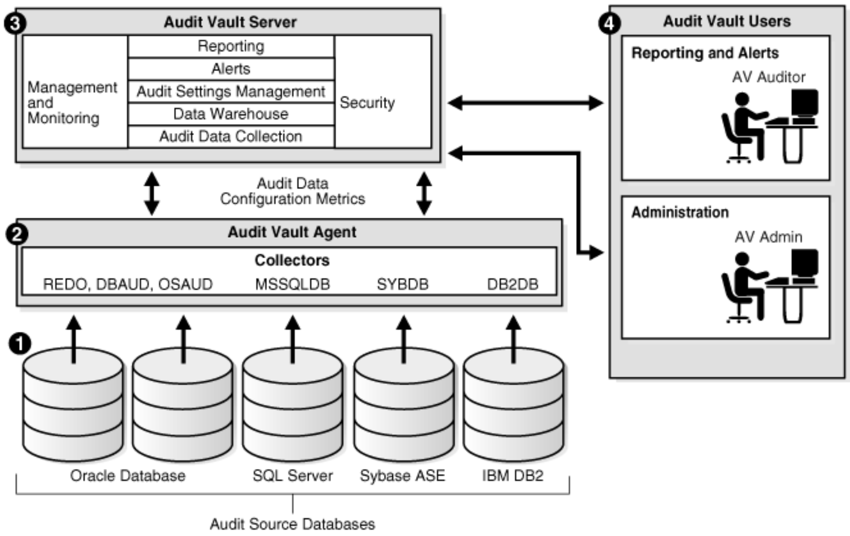
Table 1–4 (Cont.) Audit Vault Supported Collector Types by Audit Source and Audit Trail

Audit Source	Collector Type	Audit Trail
Sybase ASE	SYBDB	System audit tables (`sysaudits_01` through `sysaudits_08`) in the `sybsecurity` database
IBM DB2	DB2DB	ASCII text files extracted from the binary audit log(`db2audit.log`), which are located in the `security` subdirectory of the DB2 database instance

1.2.4 How the Oracle Audit Vault Components Work Together

Figure 1–1 provides a high level overview of how the Oracle Audit Vault components work together.

Figure 1–1 Overview of the Oracle Audit Vault Components



The process flow works as follows:

1. The source databases, Oracle Database, SQL Server, Sybase ASE, and IBM DB2, have all been configured to use their respective collectors:

   - Oracle Database uses the REDO, DBAUD, and OSAUD collectors.
   - SQL Server uses the MSSQLDB collector.
   - Sybase ASE uses the SYBDB collector.
   - IBM DB2 uses the DB2DB collector.

   As you can see, you can configure multiple databases from different database product families to connect to the same Audit Vault Server.

2. The collectors listed in Step 1 retrieve the audit data from their source databases and send this data to the Audit Vault Server.

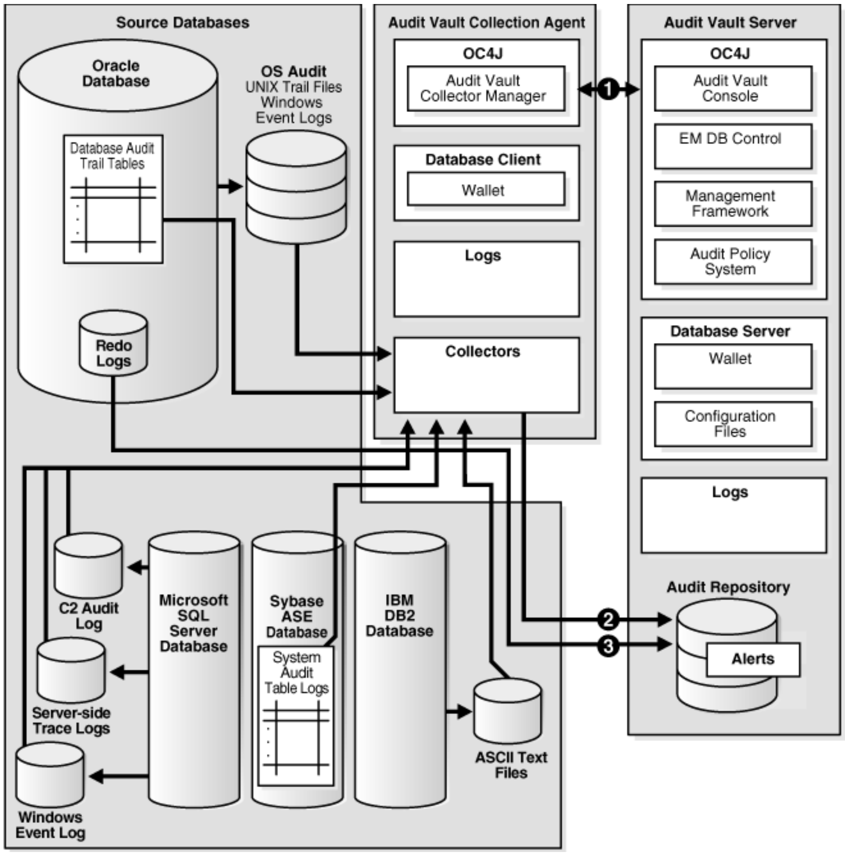
3. The Audit Vault Server collects this data and places it in the data warehouse.

   The data warehouse organizes this data into a set of internal dimension tables. The Audit Vault Server stores other information as well, for both the auditor and the administrator.

4. Once the audit data is in the data warehouse dimension tables, an auditor can retrieve this data to generate and customize reports. Any settings that you, the administrator, create are contained in this server, such as security settings. The Audit Vault Server stores all the tools that you need to configure the Audit Vault components and source databases.

Figure 1–2 shows a detailed view of the Oracle Audit Vault architecture.

Figure 1–2 Detailed View of the Oracle Audit Vault Components



The process flow works as follows:

1. The OC4J components in the Audit Vault Server and Audit Vault collection agent connect using HTTP or HTTPS.

   The OC4J is a container for Web applications that consist of the Audit Vault Console, the Oracle Enterprise Manager Database Control console, the Audit Vault internal tools (management framework), and the audit policy system used to retrieve and make available the audit settings. The HTTP (or HTTPS) connection is used for starting and stopping agents, managing metrics, and running policy retrieval-related commands.

   The Audit Vault Server contains its own database server, an Oracle wallet containing administrator's credentials. It also stores configuration information from utility settings (such as AVCA, AVCTL, and the command-line utilities used for the four database products) and log files that store operational information, such as broken database connections and missing files.

In addition to its HTTP(or HTTPS) connection, each collector in the Oracle Audit Vault collection agent maintains an OCI/JDBC connection to the Audit Vault Server using the credentials from the client wallet.

2. The collectors retrieve audit records from the source databases and send this data to the audit repository, which contains the Audit Vault data warehouse.

   The data warehouse organizes this data into a set of dimension tables. *Oracle Audit Vault Auditor's Guide* describes the data warehouse dimension tables in detail. In addition to the data warehouse, the audit repository contains auditor-created alert information..

3. Oracle Audit Vault receives data from the Oracle Database redo logs using a database link. The Oracle Database redo logs bypass the collectors.

1.3 Administrative Tools for Managing Oracle Audit Vault

You can use the following tools to administer Oracle Audit Vault:

- **Audit Vault Console.** This graphical user interface provides most of the functionality that you need to administer Oracle Audit Vault.
- **Audit Vault Configuration Assistant (AVCA) command-line utility.** Use `AVCA` to perform operations such as adding, deploying, and dropping agents, or managing wallets. See Chapter 6 for more information.
- **Audit Vault Control (AVCTL) command-line utility.** Use AVCTL to load, refresh, start, and stop Oracle Audit Vault collection agents and collectors. You also can load and purge data in the Oracle Audit Vault data warehouse with this utility. See Chapter 7 for more information.
- **Audit Vault Oracle Database (AVORCLDB) command-line utility.** Use `AVORCLDB` to configure Oracle Database source databases with Oracle Audit Vault. See Chapter 8 for more information.
- **SQL Server Database (AVMSSQLDB) command-line utility.** Use `AVMSSQLDB` to configure SQL Server source databases with Oracle Audit Vault. See Chapter 9 for more information.
- **Sybase ASE Database (AVSYBDB) command-line utility.** Use `AVSYBDB` to configure Sybase ASE source databases with Oracle Audit Vault. See Chapter 10 for more information.
- **IBM DB2 Database (AVDB2DB) command-line utility.** Use `AVDB2DB` to configure IBM DB2 source databases with Oracle Audit Vault. See Chapter 11 for more information.

1.4 Administrative Roles and Their Assigned Tasks

A default Oracle Audit Vault installation provides a set of administrative roles that you can use to manage Oracle Audit Vault. These roles provide separation-of-duty tasks.

Table 1–5 describes the various Oracle Audit Vault administrator roles and the tasks permitted for each role.

Table 1–5 Oracle Audit Vault Administrator Roles and Their Assigned Tasks

Role	When Is Role Granted?	Role Is Granted to Whom	Description
AV_ADMIN	During Server installation	Audit Vault administrator	Accesses Oracle Audit Vault services to administer, configure, and manage a running Oracle Audit Vault system. A user who is granted this role configures and manages metadata for audit source databases, collection agents, collectors, the configuration of the source with the collection agent, and the warehouse. The installation process creates and grants a user account with this role. Only the user granted the AV_ADMIN role can grant the AV_ADMIN role to other Oracle Audit Vault administrators. _ You can consider the AV_ADMIN role a super-user account for Oracle Audit Vault, except that a user who has been granted this role cannot view, update, or delete audit data. In addition, this user cannot be granted the AV_AUDITOR role.
AV_AUDITOR	During Server installation	Audit Vault auditor	Accesses Oracle Audit Vault reporting and analysis services to monitor components, detect security risks, create and evaluate alert scenarios, create detail and summary reports of events across systems, and manage the reports. A user who is granted this role manages central audit settings and alerts. This user also uses the data warehouse services to further analyze the audit data to look for trends, intrusions, anomalies, and other items of interest. The installation process creates and grants a user account with this role.
AV_AGENT	During Collection Agent registration	Collection Agent software component	Manages collection agents and collectors by starting and stopping them. Oracle Audit Vault creates this role for internal use only.
AV_SOURCE	During source database registration	Collector software component	Manages the configuration of the sources for audit data collection. Oracle Audit Vault creates this role for internal use only.
DV_OWNER	During Audit Vault Server installation	Database Vault owner	Manages Oracle Database Vault roles and configuration.
DV_ACCTMGR	During Audit Vault Server installation	Database Vault account manager	Manages database user accounts.

1.5 Planning the Source Database and Collector Configuration

This section contains:

- About Planning the Source Database and Collector Configuration
- Planning the Oracle Source Database and Collector Configuration
- Planning the Microsoft SQL Server Source Database and Collector Configuration
- Planning the Sybase ASE Source Database and Collector Configuration
- Planning the IBM DB2 Source Database and Collector Configuration

1.5.1 About Planning the Source Database and Collector Configuration

This section provides guidelines for selecting the correct Oracle Audit Vault collector for the source databases from which you want to extract audit data. In brief, for Oracle Database, the type of collector you select depends on the type of auditing that you have enabled in the source database. The Microsoft SQL Server, Sybase ASE, and IBM DB2 databases each use one collector specific to that database.

After you understand which collector to choose, you will be ready to register the source database and collector with Oracle Audit Vault.

1.5.2 Planning the Oracle Source Database and Collector Configuration

To plan the Oracle Database source database configuration:

1. Ensure that auditing has been enabled, and find the type of auditing that the source Oracle database uses.

   See *Oracle Audit Vault Auditor's Guide* for more information about the Oracle Database requirements.

2. Based on the audit trail setting, determine which collector to use.

   The type of auditing that has been enabled determines the collector you will choose. The types of collectors available are as follows:

   - **OSAUD collector.** Use this collector if the audit trail is being written to operating system files. Table 1–6 on page 1-9 lists the operating system audit trail settings that use the OSAUD collector.
   - **DBAUD collector.** Use this collector if the audit trail is being written to the database audit trail. Table 1–7 on page 1-10 lists of the database audit trail settings that use the DBAUD collector.
   - **REDO collector.** Use this collector if the database is collecting audit data from the redo logs. Table 1–8 on page 1-10 shows more information about redo logs.

3. Register the Oracle source database and the appropriate collector with Oracle Audit Vault, as described in Section 2.3.

The operating system audit settings capture the following activities:

- `SELECT` statements
- DDL and DML statements
- Succeeded and failed actions
- `SYS` operations (Set the `AUDIT_SYS_OPERATIONS` initialization parameter to `TRUE` to perform administrator auditing. SYS auditing collects SQL text information.)

Table 1–6 lists the Oracle Database operating system audit settings that use the OSAUD collector.

Table 1–6 Oracle Database Operating System Audit Settings, Which Use the OSAUD Collector

Audit Trail	Audit Trail Settings	Comments
Linux and UNIX-based Platforms (`.aud`)	`OS`	None
Linux and UNIX-based Platforms (`.xml`)	`XML, EXTENDED`	`EXTENDED` writes SQL text and SQL bind information to the audit trail
Linux and UNIX-based Platforms (syslog)	`OS`	More secure than audit records stored in operating system audit trail.
Windows Platform Windows Event log	`OS`	None
Windows Platform Operating System XML files (`.xml`)	`XML, EXTENDED`	`EXTENDED` writes SQL text and SQL bind information to the audit trail.

Table 1–7 lists the Oracle Database database audit trail settings, which must use the DBAUD collector.

Table 1–7 Oracle Database Audit Trail Settings, Which Use the DBAUD Collector

Audit Trail	Audit Trail Setting	Audited Operations	Comments
SYS.AUD$	DB or DB, EXTENDED	SELECT, DML, DDL, success and failure, SQL text, SQL bind	Extended writes SQL text and SQL bind data to the audit trail
SYS.FGA_LOG$	Does not apply. To enable fine-grained auditing, use the DBMS_FGA PL/SQL package.	Very specific user-defined audited conditions, such as the time a user modified a table column	None
DVSYS.AUDIT_ TRAIL$	N/A	Oracle Database Vault audit activity specified by audit options on realms, command rules, and so on	None

Table 1–8 shows the redo log audit trail setting, which must use the REDO collector.

Table 1–8 Oracle Database Redo Log Setting, Which Uses the REDO Collector

Audit Trail	Audit Trail Setting	Audited Operations	Comments
Redo Logs	Audit policy: capture rule	DML, DDL, before and after values	Tracks before and after changes to sensitive data columns.

1.5.3 Planning the Microsoft SQL Server Source Database and Collector Configuration

To plan the SQL Server source database configuration:

1. Ensure that auditing has been enabled in the SQL Server source database.

   See the Microsoft SQL Server product documentation for more information.

2. Understand the audit trail settings used for SQL Server databases.

   Table 1–9 lists the SQL Server audit trail settings.

3. Configure the MDDSQLDB collector to collect audit data from the SQL Server database, as described in Section 2.4.

Table 1–9 describes the SQL Server audit trail settings.

Table 1–9 Microsoft SQL Server Source Database Audit Settings, Which Use the MSSQLDB Collector

Audit Trail - Audit Logs	Audit Trail Settings	Audited Operations	Comments
C2 audit logs	Configure SQL Server security properties through SQL Server Enterprise Manager.	Auditing compliant with C2 certification. Records both failed and successful attempts to access statements and objects. Uses all or nothing approach to auditing.	Records everything.
Server-side trace logs	Run stored procedures to start and stop tracing, to configure and filter traces.	Records fine-grained security related activity. Can choose exactly which events to audit and what information about each event to record. Trace configuration information is not persistent. They are lost when you restart SQL Server.	Records specific activity. Traces can be configured to record only specific activity. Results can be filtered to record only activity that matches a certain pattern, such as a SQL verb (for example, `SELECT`, `INSERT`, `UPDATE`, `DELETE`), or that involve a particular object (for example, a specific table).
Windows Event log	Running by default.	Provides a standard, centralized way for applications (and the operating system) to record important software and hardware events.	None

1.5.4 Planning the Sybase ASE Source Database and Collector Configuration

To plan the Sybase ASE source database configuration:

1. Ensure that auditing has been enabled in the Sybase ASE source database.

   See the Sybase ASE product documentation for more information.

2. Understand the audit trail setting information used for Sybase ASE databases.

   Table 1–10 shows the Sybase ASE audit trail setting information.

3. Configure the SYBDB collector to collect audit data from the SQL Server database, as described in Section 2.5.

Table 1–10 describes an overview of the Sybase audit trail, its respective audit settings that can be implemented at the source, and the audited operations for the audit trail.

Table 1–10 Sybase ASE Database Audit Setting, Which Uses the SYBDB Collector

Audi Trail - Audit Logs	Audit Trail Setting	Audited Operation	Comments
System Audit Table Logs	Run system procedures to set global audit options, and then to enable, disable, or restart auditing.	Records standard to fine-grained audit and security-related activity Can choose exactly what to audit Can choose to audit everything or just very specific events	Implement your best practices for Sybase ASE database auditing

1.5.5 Planning the IBM DB2 Source Database and Collector Configuration

To plan the IBM DB2 source database configuration:

1. Ensure that auditing has been enabled in the IBM DB2 source database.

   See the IBM DB2 product documentation for more information.

2. Understand the audit trail information used for IBM DB2 databases.

Table 1–11 shows the IBM DB2 audit trail setting information.

3. Configure the DB2DB collector to collect audit data from the DB2 database, as described in Section 2.6.

Table 1–11 describes the IBM DB2 audit trail.

Table 1–11 IBM DB2 Database Audit Setting, Which Uses the DB2DB Collector

Audit Trail - Audit Logs	Audit Trail Setting	Audited Operation	Comments
ASCII text files	Run the `DB2AUDIT` command to enable auditing, disable auditing, and set auditing operations.	**Audit (AUDIT).** Changes to audit records or when the audit log is accessed **Authorization Checking (CHECKING).** Authorization checking during attempts to access or manipulate DB2 database objects or functions **Security Maintenance (SECMAINT).** Grants or revokes to object or database privileges or to the `DBADM` privilege; also modification of the `SYSADM_GROUP`, `SYSCTRL_GROUP`, or `SYSMAINT_GROUP` configuration parameters **Object Maintenance (OBJMAINT).** Creating and dropping data objects **System Administration (SYSADMIN).** Operations requiring `SYSADM`, `SYSMAINT`, or `SYSCTRL` privileges **User Validation (VALIDATE).** Authentication of users or retrieval of system security information **Operation Context (CONTEXT).** Database operation context performed. Helps when interpreting the audit log file. See the IBM DB2 documentation for more information about how the operation context of a DB2 database is audited. In addition to these categories, you can audit successes, failures, or both.	Implement your best practices for IBM DB2 database auditing

2 Registering Source Databases and Collectors

This chapter contains:

- General Steps for Adding Sources and Deploying Collectors
- Checking and Setting Linux and UNIX Environment Variables
- Registering Oracle Database Sources and Collectors
- Registering Microsoft SQL Server Database Sources and Collector
- Registering Sybase ASE Database Sources and Collector with Audit Vault
- Registering IBM DB2 Database Sources and Collector with Audit Vault
- Starting the Collection Agents
- Starting the Collectors
- Checking the Status of the Collectors
- Checking if the Collectors Are Collecting Audit Records

2.1 General Steps for Adding Sources and Deploying Collectors

You must perform the following general tasks to add source databases to Oracle Audit Vault and then deploy collectors:

1. For Linux and UNIX platforms, check and set environment variables in the shells in which you will be interacting with the Audit Vault Server and the Audit Vault Collection Agent.

   See Section 2.2.

2. Add a source Oracle database and collectors using the `AVORCLDB` command-line utility.

   See Section 2.3.

3. To add a Microsoft SQL Server source database and collector, use the `AVMSSQLDB` command-line utility

   See Section 2.4.

4. To add a Sybase ASE source database and collector, use the `AVSYBDB` command-line utility

   See Section 2.5.

5. To add an IBM DB2 source database and collector, use the AVDB2DB command-line utility.

   See Section 2.6.

6. Start the collection agents and collectors using the AVCTL command-line utility.

   See Section 2.7 and Section 2.8.

7. Periodically ensure that the collectors are running and collecting audit data.

   See Section 2.9 and Section 2.10.

2.2 Checking and Setting Linux and UNIX Environment Variables

This section contains:

- About Checking and Setting Linux and UNIX Environment Variables
- Setting Environment Variables for the Audit Vault Server
- Setting Environment Variables for the Audit Vault Collection Agent Shell
- Setting Environment Variables for the Source Oracle Database Shell

2.2.1 About Checking and Setting Linux and UNIX Environment Variables

For Linux and UNIX platforms, you must set environment variables before you begin the procedures in this chapter. You set these variables in the three shells that you will use to perform the configuration. *Keep these shells open throughout the configuration process.* You will need to access them periodically as you complete the configuration steps. If you need to reopen a shell, then you must reset its environment variables.

2.2.2 Setting Environment Variables for the Audit Vault Server

As expected, you use the Audit Vault Server shell to interact with the Audit Vault Server. To set the environment variables for the Audit Vault Server, you can run either of two scripts, coraenv (for the C shell) or oraenv (for the Bourne, Bash, or Korn shell).

Table 2–1 describes how the coraenv and oraenv scripts set the environment variables.

Table 2–1 Audit Vault Server Environment Variable Settings

Environment Variable	Notes
ORACLE_HOME	Sets to the Audit Vault Server home directory.
ORACLE_SID	Prompts for the Oracle system identifier (SID) for the Audit Vault Server. By default, this SID is av.
PATH	Appends $ORACLE_HOME/bin to your PATH environment variable.
LD_LIBRARY_PATH	Appends $ORACLE_HOME/lib to your LD_LIBRARY_PATH environment variable setting. Applies to Linux x86, Linux x86_64, and Solaris SPARC_64 installations only.
SHLIB_PATH	Appends $ORACLE_HOME/lib to your SHLIB_PATH environment variable setting. Applies to HP-UX installations only.
LIBPATH	Appends $ORACLE_HOME/lib to your LIBPATH environment variable setting. Applies to AIX installations only.

To set environment variables for the Audit Vault Server shell:

1. In the server where you deployed the Oracle Audit Vault Server, open a shell.
2. Run one of the following scripts, which are located in the `/usr/local/bin` directory:
   - **C shell:** `coraenv`
   - **Bourne, Bash, or Korn shell:** `oraenv`
3. To test that the script was successful, try invoking the following command:

   ```
   $  avctl -help
   ```

   It should return help information for the `AVCTL` utility, and the only way it can do that is if the `ORACLE_HOME` and `PATH` environment variables are correctly set. If the scripts fail, then manually set the environment variables listed in Table 2–1.
4. If you plan to add Microsoft SQL Server, Sybase ASE, or IBM DB2 source databases to Oracle Audit Vault, then set the `LANG` environment variable.

   The following examples set the language for the `AVSYBDB` utility to German using the ISO 88591 character set:
   - **C shell:** `(setenv LANG de_DE.AL32UTF8; avsydb)`
   - **Bourne, Bash, or Korn shell:** `LANG=de_DE.AL32UTF8 avsybdb`

   Always specify the AL32UTF8 character set. Oracle Audit Vault supports the following languages:

   `en`: English

   `de`: German

   `es`: Spanish

   `fr`: French

   `it`: Italian

   `ja`: Japanese

   `ko`: Korean

   `pt_BR`: Brazilian Portuguese

   `zh_CN`: Simplified Chinese

   `zh_TW`: Traditional Chinese

   Optionally, you can set the `LANG` environment variable in the `.profile` or `.cshrc` file.

   You do not need to set this variable for the `AVORCLDB` utility. This utility automatically uses the `NLS_LANG` environment variable setting, which is set during installation. See *Oracle Database Globalization Support Guide* for more information about language support for Oracle Database.
5. Leave the Audit Vault Server shell open for the remaining procedures in this chapter.

2.2.3 Setting Environment Variables for the Audit Vault Collection Agent Shell

To set environment variables for the Audit Vault collection agent shell:

1. In the server where you deployed the Audit Vault collection agent, open a shell.
2. Check and manually set the `ORACLE_HOME` environment variable to the Audit Vault Collection Agent home directory.
3. Check and set the `LD_LIBRARY_PATH` environment variable to include `$ORACLE_HOME/lib`.

4. Check and set the PATH environment variable to include $ORACLE_HOME/bin. Be sure that you append this information to the existing PATH information.

5. Ensure that the following environment variables are not set: ORACLE_SID, TNS_ADMIN, and TWO_TASK.

6. To test that you correctly set these environment variables, try invoking the following command:

   ```
   $  avctl -help
   ```

   It should return help information for the AVCTL utility, and the only way it can do that is if the ORACLE_HOME and PATH environment variables are correctly set.

7. If you plan to add Microsoft SQL Server, Sybase ASE, or IBM DB2 databases Oracle Audit Vault, then set the LANG environment variable.

   See Step 4 under Section 2.2.3 for instructions.

8. Leave the Audit Vault collection agent shell open for the remaining procedures in this chapter.

2.2.4 Setting Environment Variables for the Source Oracle Database Shell

To set the environment variables for the source database, you can run the same scripts, corenv or oraenv, that you used to set the Audit Vault Server environment variables. Table 2–1 on page 2-2 describes how these scripts set the environment variables, except that for the source database, they set the ORACLE_SID variable to orcl, unless you have given it a different name during installation.

To set environment variables for the source database:

1. In the server where you installed the source Oracle database, open a shell.

2. From the /usr/local/bin directory, run one of the following scripts:

   - **C shell:** coraenv script
   - **Bourne, Bash, or Korn shell:** oraenv script

3. Leave the source Oracle database shell open for the remaining procedures in this chapter.

2.3 Registering Oracle Database Sources and Collectors

This section contains:

- Step 1: If Necessary, Create a Password File
- Step 2: Create a User Account on the Source Oracle Database
- Step 3: Verify That the Source Database Is Compatible with the Collectors
- Step 4: Register the Source Oracle Database with Oracle Audit Vault
- Step 5: Add the Oracle Collectors to Oracle Audit Vault
- Step 6: Enable the Audit Vault Agent to Run the Oracle Database Collectors

2.3.1 Step 1: If Necessary, Create a Password File

If you use Oracle Database Vault to protect the source Oracle database, you must have a password file created. A connection to the source database using the SYSDBA or SYSOPER privilege succeeds only if the password file has been created. Some later versions of Database Vault enable operating system authentication by default. For information about the orapwd utility, which you can use to create a password file for Oracle Database Vault, see *Oracle Database Administrator's Guide*, or see Enabling or Disabling Connections with the SYSDBA Privilege in *Oracle Audit Vault Server Installation Guide for Linux x86*.

2.3.2 Step 2: Create a User Account on the Source Oracle Database

The collectors that you will configure later on must use this user account to access audit data from the source Oracle database.

To create the user account:

1. Access the shell used by the source Oracle database.
2. Log in to SQL*Plus as a user who has been granted the CREATE USER privilege.

   If the source database is protected by Oracle Database Vault, log in as a user who has been granted the DV_ACCTMGR (Database Vault Account Manager) role.

   For example:

   ```
   $ sqlplus sec_mgr
   Enter password: password
   Connected.
   ```

3. Create the source Oracle database user account.

   For example:

   ```
   SQL> CREATE USER srcuser_ora IDENTIFIED BY password;
   ```

4. Connect as user SYS with the SYSDBA privilege.

   ```
   SQL> CONNECT SYS/AS SYSDBA
   Enter password: password
   ```

5. Run the zarsspriv.sql script.

   This script grants the source Oracle database user account the privileges needed to enable the collectors to access audit data. By default, this script is located in the $ORACLE_HOME/av/scripts/streams/source directory in both the Audit Vault Server and the Audit Vault Collection Agent Oracle home directories.

   Use the following syntax:

   ```
   zarsspriv.sql srcusr mode
   ```

   In this specification:

   - *srcusr*: Enter the name of the user account that you just created.
   - *mode*: Specify one of the following modes. Enter the modes in upper case letters.
     - SETUP: For the OSAUD and DBAUD collectors, and for policy management
     - REDO_COLL: For the REDO log collector; includes all privileges that are granted using the argument mode SETUP.

   For example, to specify the SETUP mode for user srcuser_ora:

   ```
   SQL> @zarsspriv.sql srcuser_ora SETUP
   ```

```
Granting privileges to SRCUSER_ORA ... Done.
```

6. Connect as the source user that you created in Step3 and then check that the privileges were granted.

   ```
   SQL> CONNECT srcuser_ora
   Enter password: password
   Connected.

   SQL> SELECT * FROM SESSION_PRIVS;
   SQL> SELECT * FROM SESSION_ROLES;
   ```

   The output for each SELECT statement should list the privileges and roles that are listed in the zarsspriv.sql file, such as the CREATE SESSION privilege and the RESOURCE role.

7. If the source database has Oracle Database Vault installed, log in as a user who has been granted the DV_OWNER (Database Vault Owner) role, and then add the source user to the Oracle Data Dictionary realm.

   For example:

   ```
   SQL> CONNECT dbvowner
   Enter password: password
   Connected.

   SQL> EXEC DBMS_MACADM.ADD_AUTH_TO_REALM('Oracle Data Dictionary', 'SRCUSER_
   ORA', null, dbms_macutl.g_realm_auth_participant);
   SQL> COMMIT;
   ```

8. If the source database has Oracle Database Vault installed, grant the source Oracle database user account the DV_SECANALYST role.

   The DV_SECANALYST role enables the user to run Oracle Database Vault reports and monitor Oracle Database Vault. This role also enables the source Oracle database user to collect Database Vault audit trail data from the source database.

   For example:

   ```
   SQL> GRANT DV_SECANALYST TO srcuser_ora;
   ```

9. Leave this shell open.

2.3.3 Step 3: Verify That the Source Database Is Compatible with the Collectors

Next, you are ready to verify that the source Oracle database is compatible with the collector type in the collection agent home.

To verify the source Oracle database compatibility:

1. Access either the shell used for the Audit Vault Server or the collection agent.
2. Run the following command and make a note of the host, port, and service settings:

   ```
   $ lsnrctl status
   ```

3. Run the avorcldb verify command, using the values the LSNRCTL utility returned.

   You must specify the host name, port number, and service name. Typically, for Oracle Database, the host is the fully qualified domain name or the IP address of the server on which the source Oracle database is running, and the port number is 1521. You can find this information in the `tnsnames.ora` file of the source database.

In the following example, the host is `hrdb.example.com`, the port number is `1521`, the service name is `orcl`, and the user account is `srcuser_mss`:

```
$ avorcldb verify -src hrdb.example.com:1521:orcl -colltype ALL
Enter Source user name: srcuser_ora
Enter Source password: password
```

See Section 8.10 for detailed information about the `avorcldb verify` command.

4. Do not close this shell.

The `AVORCLDB` utility checks if an Audit Vault collector can be run against the source database configuration.

Example 2–1 shows what happens if the source Oracle database is not properly configured. In this case, you will need to set the initialization parameters listed in output before you can use the REDO log collector.

Example 2–1 Partially Successful Verify Operation of Source Compatibility with the Collectors

```
$ avorcldb verify -src hrdb.example.com:1521:orcl -colltype ALL
Enter Source user name: srcuser_ora
Enter Source password: password

source hrdb.EXAMPLE.COM verified for OS File Audit Collector
source hrdb.EXAMPLE.COM verified for Aud$/FGA_LOG$ Audit Collector
Source database must be in ARCHIVELOG mode to use REDO Log collector
Incorrect database compatibility 9.2.0; recommended value is 10.2.0.0.0
Parameter _JOB_QUEUE_INTERVAL not set; recommended value range [1 - ANY_VALUE]
Parameter JOB_QUEUE_PROCESSES = 0 not in recommended value range [4 - ANY_VALUE]
Parameter AQ_TM_PROCESSES = 0 is not in required value range [4 - ANY_VALUE]
Parameter UNDO_RETENTION = 900 not in recommended value range [3600 - ANY_VALUE]
Parameter GLOBAL_NAMES = false not set to recommended value true
Please set the above init.ora parameters to recommended values
```

After you correct the problems (in this case, setting all those missing initialization parameters), rerun the `avorcldb verify` command to ensure that the result is as you want it. Example 2–2 shows what happens after this source database has been properly configured. See also Chapter 12, "REDO Collector Database Reference."

Example 2–2 Successful Verify Operation of Source Compatibility with the REDO Collector

```
$ avorcldb verify -src hrdb.example.com:1521:orcl -colltype REDO
Enter Source user name: srcuser_ora
Enter Source password: password

source hrdb.EXAMPLE.COM verified for REDO Log Audit Collector collector
```

2.3.4 Step 4: Register the Source Oracle Database with Oracle Audit Vault

To register the source Oracle database wtih Oracle Audit Vault:

1. Access the shell used for the Audit Vault Server.
2. Run the `avorcldb add_source` command.

   For example:

```
$ avorcldb add_source -src hrdb.example.com:1521:orcl
                      -desc 'HR Database'
                      -agentname agent1
Enter Source user name: srcuser_ora
Enter Source password: password

Adding source...
Source added successfully.
source successfully added to Audit Vault

remember the following information for use in avctl
Source name (srcname): HRDB.EXAMPLE.COM
Storing user credentials in wallet...
Create credential oracle.security.client.connect_string3
done.
Mapping Source to Agent...
```

In this example:

- `-src`: Enter the source database connection information: host name, port number, and service name, separated by a colon. If you are unsure of this information, check the `tnsnames.ora` file for the source database.
- `-desc`: Optionally, enter a brief description for the source database.
- `-agentname`: Optionally, create a name for the collector agent to be associated with this source database. However, you must specify an agent name if auditors plan to configure policy management using the Audit Vault Console.
- `Source user name` and `password`: Enter the user account information you created in Step 2: Create a User Account on the Source Oracle Database.

See Section 8.3 for detailed information about the `avorcldb add_source` command.

3. Make a note of the return value from the output.

   You will need this value, which represents the global database name, for subsequent steps in this section. In this example, the return value is `HRDB_EXAMPLE.COM`.

4. Do not close this shell.

2.3.5 Step 5: Add the Oracle Collectors to Oracle Audit Vault

You can add one or more collectors to Oracle Audit Vault, depending on your needs. The available collector types are listed in Table 1–4 on page 1-4.

To add a collector to Audit Vault:

1. If you plan to use the OSAUD collector, access the shell used for the source Oracle database.
2. Log in to SQL*Plus as `SYS` with the `SYSDBA` privilege.

   ```
   $ sqlplus sys/as sysdba
   Enter password: password
   Connected.
   ```

3. Set the maximum operating system file size to a setting equal to or less than 204800.

If the operating system file grows larger than 2 GB, then the OSAUD collector ignores all audit records created past this size. Use the following SQL statement to set the maximum size to 102400 KB, which translates as 2 GB.

```
BEGIN
  DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_PROPERTY(
   AUDIT_TRAIL_TYPE            =>  DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS,
   AUDIT_TRAIL_PROPERTY        =>  DBMS_AUDIT_MGMT.OS_FILE_MAX_SIZE,
   AUDIT_TRAIL_PROPERTY_VALUE  =>  204800);
END;
/
```

Afterwards, when the operating system exceeds 2 GB, then Oracle Database stops appending audit records to the current file and then creates a new file to resume the audit data collection.

For reference information about the `DBMS_AUDIT_MGMT` PL/SQL package, see Chapter 14.

4. Access the shell used for the Audit Vault Server.
5. Run the `avorcldb add_collector` command to add the collectors you want.

   For example:

   ```
   avorcldb add_collector -srcname HRDB.EXAMPLE.COM
                          -agentname agent1
                          -colltype OSAUD
                          -orclhome /u01/app/oracle/product/10.2.0/db_1
   ```

   In this example:

   - `-srcname`: Create a name for this source database, which Oracle Audit Vault will refer to when collecting audit data. Remember that the source name is case sensitive.
   - `-agentname`: Enter the name for the agent that you created in Step 4: Register the Source Oracle Database with Oracle Audit Vault.
   - `-colltype`: Enter `OSAUD`, `DBAUD`, or `REDO`.
   - `-orclhome`: Enter the Oracle source database home directory. For Microsoft Windows installations of Oracle Database, enter the path using forward slashes, or if you want to use back slashes, enclose the path in double quotation marks.

   See Section 8.2 for detailed information about the `avorcldb add_collector` command.
6. Optionally, modify the attributes associated with the collector.

   The collector has a set of default attributes. You can modify these by using the `avorcldb alter_collector` command. See Section 8.4.
7. Do not close this shell.

Example 2–3 shows how to add the OSAUD collector to Audit Vault for UNIX platforms. You must include the `-orclhome` *`orclhome`* parameter to specify the location of the source database as an absolute path, if `u01/app` is the Oracle base directory.

Example 2–3 Adding the OSAUD Collector to Audit Vault for UNIX Platforms

```
$ avorcldb add_collector -srcname hrdb.example.com
                         -agentname agent1
```

```
                         -colltype OSAUD
                         -orclhome /u01/app/oracle/product/10.2.0/db_1

source HRDB.EXAMPLE.COM verified for OS File Audit Collector collector
Adding collector...
Collector added successfully.
collector successfully added to Audit Vault

remember the following information for use in avctl
Collector name (collname): OSAUD_Collector
```

Example 2–4 shows how to add the OSAUD collector to Oracle Audit Vault on Microsoft Windows for the event log and XML audit trail. You must include the `-orclhome` *`orclhome`* parameter to specify the location of the source database. Use forward slashes instead of back slashes for the Microsoft Windows path. If you want to use back slashes, enclose the path in double quotation marks (for example, `-orclhome "c:\oracle\product\10.2.0\db_1"`).

Example 2–4 Adding the OSAUD Collector to Audit Vault on Windows for the Event Log and XML Audit Trail

```
$ avorcldb add_collector -srcname HRDB.EXAMPLE.COM
                         -agentname agent1
                         -colltype OSAUD
                         -orclhome c:/oracle/product/10.2.0/db_1

source HRDB.EXAMPLE.COM verified for Windows Event Log Audit Collector collector
Adding collector...
Collector added sucessfully.
collector successfully added to Audit Vault

remember the following information for use in avctl
Collector name (collname): OSAUD_Collector
```

Example 2–5 shows how to add the DBAUD collector to Audit Vault.

Example 2–5 Adding the DBAUD Collector to Audit Vault

```
$ avorcldb add_collector -srcname HRDB.EXAMPLE.COM
                         -agentname agent1 -colltype DBAUD

source HRDB.EXAMPLE.COM verified for Aud$/FGA_LOG$ Audit Collector collector
Adding collector...
Collector added successfully.
collector successfully added to Audit Vault

remember the following information for use in avctl
Collector name (collname): DBAUD_Collector
```

Example 2–6 shows how to add the REDO collector to Audit Vault and shows that value for the `-av` argument must be supplied for this collector type.

Example 2–6 Adding the REDO Collector to Audit Vault

```
$ avorcldb add_collector -srcname HRDB.EXAMPLE.COM
                         -agentname agent1
                         -colltype REDO
                         -av hrdb.example.com:1521:orcl

source HRDB.EXAMPLE.COM verified for REDO Log Audit Collector collector
```

```
Adding collector...
Collector added successfully.
collector successfully added to Audit Vault

remember the following information for use in avctl
Collector name (collname): REDO_Collector
initializing REDO Collector
setting up APPLY process on Audit Vault server
setting up CAPTURE process on source database
```

> **Tip:** If the REDO collector does not initialize, the `APPLY` process on the Audit Vault Server and `CAPTURE` process on the source database cannot start. This problem happens if the source user account does not have the correct privileges. Ensure that you ran the `zarsspriv.sql` script, described in Section 2.3.2.

2.3.6 Step 6: Enable the Audit Vault Agent to Run the Oracle Database Collectors

You now are ready to add the collection agent credentials to the source Oracle database. This process adds the source user credentials to the wallet, creates a database alias in the wallet for the source user, and verifies the connection to the source using the wallet. This way, the Audit Vault agent can run the Oracle Database collectors. You must complete this step so that the collectors can start properly.

To enable to Audit Vault agent to run the Oracle Database collectors:

1. Access the shell used for the Audit Vault collection agent.
2. Use the `avorcldb setup` command to add the collection agent credentials.

   For example:

   ```
   $ avorcldb setup -srcname hrdb.example.com

   Enter Source user name: srcuser_ora
   Enter Source password: password

   adding credentials for user srcuser_ora for connection [SRCDB1]
   Storing user credentials in wallet...
   Create credential oracle.security.client.connect_string3
   done.
   updated tnsnames.ora with alias [SRCDB1] to source database
   verifying SRCDB1 connection using wallet
   ```

   In this example:

   - `-srcname`: Enter the name of the source database that you plan to use.
   - `Source user name` and `password`: Enter the source database user name and password that you created in Step 2: Create a User Account on the Source Oracle Database.

   See Section 8.9 for detailed information about the `avorcldb setup` command.
3. Do not close this shell.

This step completes the registration for the source Oracle database and its collectors. Next, you must start the collection agents and collectors. See Section 2.7 and Section 2.8 for more information.

2.4 Registering Microsoft SQL Server Database Sources and Collector

This section contains:

- Step 1: Download the SQL Server 2005 Driver for JDBC
- Step 2: Create a User Account on the Source Microsoft SQL Server Database
- Step 3: Verify That the Source Database Is Compatible with the Collector
- Step 4: Register the Source SQL Server Database with Oracle Audit Vault
- Step 5: Add the MSSQLDB Collector to Audit Vault
- Step 6: Enable the Audit Vault Agent to Run the MSSQLDB Collector

2.4.1 Step 1: Download the SQL Server 2005 Driver for JDBC

Ensure that you have downloaded the SQL Server 2005 Driver for JDBC (`sqljdbc.jar`) to the `$ORACLE_HOME/jlib` directories in both the Audit Vault Server and Audit Vault Agent homes. This driver provides high performance native access to Microsoft SQL Server 2000 and 2005 database data sources. Ensure that this jar file is present in the Oracle Audit Vault OC4J before starting the agent OC4J. The MSSQLDB collector uses this driver to collect audit data from Microsoft SQL Server databases.

See Also:

- *Oracle Audit Vault Server Installation Guide for Linux x86* for information about downloading and copying JDBC driver files for Microsoft SQL Server
- *Oracle Audit Vault Collection Agent Installation Guide* for information about downloading and copying JDBC driver files for Microsoft SQL Server
- *Oracle Audit Vault Collection Agent Installation Guide* to ensure the `sqljdbc.jar` file is present in the Oracle Audit Vault OC4J before starting the agent OC4J

2.4.2 Step 2: Create a User Account on the Source Microsoft SQL Server Database

The collector that you will configure later on must use this user account to access audit data from the source Microsoft SQL Server database. After you create the user account, the privileges you assign this user depend on whether the source database is Microsoft SQL Server 2000 or 2005.

To create the user account:

1. Log in to the source Microsoft SQL Server database.
2. Create a user account.

   For example, to create a user account named `srcuser_mss`:

   ```
   EXEC sp_addlogin srcuser_mss, password
   ```

For a Microsoft SQL Server 2005 database, grant this user the `alter_trace` privilege.

1. Log in as the `SYSADMIN` user.
2. Run the following command to grant the alter trace privilege to the user.

   For example:

```
GRANT ALTER TRACE TO srcuser_mss
```

For a Microsoft SQL Server 2000 database, grant the user the `SYSADMIN` fixed server role.

1. Click **Security**.
2. Click **Logins**.
3. Right-click the login you created, for example, `srcuser_mss`.
4. Click **Properties**.
5. On the left pane, click **Server Roles**.
6. Select the **sysadmin option**, and then click **OK**.

2.4.3 Step 3: Verify That the Source Database Is Compatible with the Collector

Next, you are ready to verify that the source Microsoft SQL Server database is compatible with the collector type in the collection agent home.

To verify the source database compatibility:

1. Access either the shell used for the Audit Vault Server or the collection agent.
2. Run the `avmssqldb verify -src` command.

   You must specify the host name and port number. Typically, for Microsoft SQL Server, the host is the fully qualified domain name or the IP address of the server on which the source SQL Server database is running, and the port number is 1433. For example, assuming the host is `hrdb.example.com and` the port number is `1433`, and the user account is `srcuser_mss`:

   ```
   $ avmssqldb verify -src hrdb.example.com:1433
   Enter a username : srcuser_mss
   Enter a password: password

   ***** Source Verified *****
   ```

   See Section 9.10 for detailed information about the `avmssqldb verify -src` command.
3. Do not close this shell.

2.4.4 Step 4: Register the Source SQL Server Database with Oracle Audit Vault

1. Access the shell for the Audit Vault Server.
2. Run the `avmssqldb add_source` command.

   For example:

   ```
   $ avmssqldb add_source -src hrdb.example.com:1433 -srcname mssqldb4 -desc 'HR
   Database'
   Enter a username :srcuser_mss
   Enter a password : password

   ***** Source Verified *****
   ***** Source Added Successfully *****
   ```

   In this example:

   - `-src`: Enter the fully qualified domain name (or IP address) and port number for the source database that you specified in Step 3: Verify That the Source Database Is Compatible with the Collector.

- -srcname: Create a name for the source database. Oracle Audit Vault refers to this name when it collects audit data.
- -desc: Optionally, enter a brief description for the source database.
- username and password: Enter the username and password that you created in Step 2: Create a User Account on the Source Microsoft SQL Server Database.

See Section 9.3 for detailed information about the avmssqldb add_source command.

3. Do not close this shell.

2.4.5 Step 5: Add the MSSQLDB Collector to Audit Vault

Next, you are ready to add the MSSQLDB collector to Audit Vault. By default, the MSSQLDB collector collects audit records from all audit trails that have been enabled in the source database: C2 audit logs, server-side trace logs, and the Windows Event log.

To add the MSSQLDB collector to Audit Vault:

1. Access the shell used for the Audit Vault Server.
2. Run the avmssqldb add_collector command.

   For example:

   ```
   $ avmssqldb add_collector -srcname mssqldb4 -agentname agent1
   Enter a username :srcuser_mss
   Enter a password : password

   ***** Collector Added Successfully*****
   ```

   In this example:

   - -srcname: Enter the source database name that you specified in Step 3: Verify That the Source Database Is Compatible with the Collector.
   - -agentname: Create a name for the agent.

   See Section 9.2 for detailed information about the avmssqldb add_collector command.
3. Optionally, modify the attributes associated with the MSSQLDB collector.

   The MSSQLDB collector has a set of default attributes. You can modify these by using the avssqldb alter_collector command. See Section 9.4.
4. Do not close this shell.

2.4.6 Step 6: Enable the Audit Vault Agent to Run the MSSQLDB Collector

You now are ready to add the collection agent credentials to the source Microsoft SQL Server database. This process adds the source user credentials to the wallet, creates a database alias in the wallet for the source user, and verifies the connection to the source using the wallet. This way, the Audit Vault agent can run the MSSQLDB collector. You must complete this step so that the collectors can start properly.

To enable the Audit Vault agent to run the MSSQLDB collector:

1. Access the shell used for the Audit Vault collection agent.
2. Run the avmssqldb setup command.

For example:

```
$ avmssqldb setup -srcname mssqldb4
Enter a username :srcuser_mss
Enter a password : password

***** Credentials Successfully added *****
```

In this example:

- `-srcname`: Enter the source database name that you specified in Step 3: Verify That the Source Database Is Compatible with the Collector.
- `username` and `password`: Enter the username and password that you created in Step 2: Create a User Account on the Source Microsoft SQL Server Database.

See Section 8.9 for detailed information about the `avmssqldb setup` command.

3. Do not close this shell.

This step completes the registration for the source Microsoft SQL Server database and its collector. Next, you must start the collection agent and collector. See Section 2.7 and Section 2.8 for more information.

2.5 Registering Sybase ASE Database Sources and Collector with Audit Vault

This section contains:

- Step 1: Download the jConnect for JDBC Driver
- Step 2: Create a User Account on the Source Sybase ASE Database
- Step 3: Verify That the Source Database Is Compatible with the Collector
- Step 4: Register the Source Sybase ASE Database with Oracle Audit Vault
- Step 5: Add the SYBDB Collector to Oracle Audit Vault
- Step 6: Enable the Audit Vault Agent to Run the SYBDB Collector

2.5.1 Step 1: Download the jConnect for JDBC Driver

Ensure that you have downloaded the jConnect for JDBC driver JDBC (`jconn3.jar`) to the `$ORACLE_HOME/jlib` directories in both the Audit Vault Server and Audit Vault Agent homes. This driver provides high performance native access to Sybase ASE database data sources. Ensure that this jar file is present in the Oracle Audit Vault OC4J before starting the agent OC4J. The SYBDB collector uses this driver to collect audit data from Sybase ASE databases.

See Also:

- *Oracle Audit Vault Server Installation Guide for Linux x86* for information about downloading and copying JDBC driver files for Sybase ASE
- *Oracle Audit Vault Collection Agent Installation Guide* for information about downloading and copying JDBC driver files for Sybase ASE
- *Oracle Audit Vault Collection Agent Installation Guide* to ensure the `sqljdbc.jar` file is present in the Oracle Audit Vault OC4J before starting the agent OC4J

2.5.2 Step 2: Create a User Account on the Source Sybase ASE Database

The collector that you will configure later on must use this user account to access audit data from the source Sybase ASE database.

To create the user account:

1. Log in to the source Sybase ASE database.
2. Create a user account.

   For example:

   ```
   sp_addlogin srcuser_syb, password
   ```

3. Add this user to the source Sybase ASE database.

   ```
   sp_adduser srcuser_syb
   ```

4. Grant the `SSO_role` privilege to the source user.

   ```
   grant role sso_role to srcusr_syb
   ```

2.5.3 Step 3: Verify That the Source Database Is Compatible with the Collector

Next, you are ready to verify that the source Sybase database is compatible with the collector type in the collection agent home:

To verify the source Sybase database compatibility:

1. Access either the shell used for the Audit Vault Server or the collection agent.
2. Run the `avsybdb verify` command.

   You must specify the host name and port number. Typically, for Sybase ASE, the host is the fully qualified domain name or IP address of the server on which the source Sybase ASE database is running, and the port number is 5000. For example, assuming the host is `hrdb.example.com and` the port number is `5000`, and the user account is `srcuser_mss`:

   For example:

   ```
   $ avsybdb verify -src hrdb.example.com:5000
   Enter a username :srcuser_syb
   Enter a password : password

   ***** Source Verified *****
   ```

   See Section 10.10 for detailed information about the `avsybdb verify` command.

3. Do not close this shell.

2.5.4 Step 4: Register the Source Sybase ASE Database with Oracle Audit Vault

1. Access the shell used for the Audit Vault Server.
2. Run the `avsybdb add_source` command.

   For example:

   ```
   $ avsybdb add_source -src hrdb.example.com:5000 -srcname  sybdb4
   Enter a username :srcuser_syb
   Enter a password : password

   ***** Source Verified *****
   ***** Source Added Successfully *****
   ```

   In this example:

   - `-src`: Enter the fully qualified domain name (or IP address) and port number for the source database that you verified in Step 3: Verify That the Source Database Is Compatible with the Collector.
   - `-srcname`: Create a name for this source database. Oracle Audit Vault refers to this name when it collects audit data.
   - `username` and `password`: Enter the user name and password that you created in Step 2: Create a User Account on the Source Sybase ASE Database.

   See Section 10.3 for detailed information about the `avsybdb add_source` command.
3. Do not close this shell.

2.5.5 Step 5: Add the SYBDB Collector to Oracle Audit Vault

1. Access the shell used for the Audit Vault Server.
2. Run the `avsybdb add_collector` command.

   For example:

   ```
   $ avsybdb add_collector -srcname sybdb4 -agentname agent1
   Enter a username :srcuser_syb
   Enter a password : password

   ***** Collector Added Successfully*****
   ```

   In this example:

   - `-srcname`: Create a name for the source database. Oracle Audit Vault refers to this name when collecting audit data.
   - `-agentname`: Create a name for the agent.
   - `username` and `password`: Enter the user name and password that you created in Step 2: Create a User Account on the Source Sybase ASE Database.

   See Section 10.2 for detailed information about the `avsybdb add_collector` command.
3. Optionally, modify the attributes associated with the collector.

   The collector has a set of default attributes. You can modify these by using the `avsybdb alter_collector` command. See Section 10.4.
4. Do not close this shell.

2.5.6 Step 6: Enable the Audit Vault Agent to Run the SYBDB Collector

You now are ready to configure the collection agent credentials to the source Sybase ASE database. This process adds the source user credentials to the wallet, creates a database alias in the wallet for the source user, and verifies the connection to the source using the wallet. This way, the Audit Vault agent can run the SYBDB collector. You must complete this step so that the collectors can start properly.

To enable the Audit Vault agent to run the SYBDB collector:

1. Access the shell used for the Audit Vault collection agent.
2. Run the `avsybdb setup` command.

   For example:

   ```
   $ avsybdb setup -srcname sybdb4
   Enter a username :srcuser_syb
   Enter a password : password

   ***** Credentials Successfully added *****
   ```

   In this example:

   - `-srcname`: Enter the source database name that you created in Step 5: Add the DB2DB Collector to Oracle Audit Vault.
   - `username` and `password`: Enter the user name and password that you created in Step 2: Create a User Account on the Source Sybase ASE Database.

   See Section 10.9 for detailed information about the `avsybdb setup` command.
3. Do not close this shell.

This step completes the registration for the source Sybase ASE database and its collector. Next, you must start the collection agent and collector. See Section 2.7 and Section 2.8 for more information.

2.6 Registering IBM DB2 Database Sources and Collector with Audit Vault

This section contains:

- Step 1: Download the IBM DB2 UDB JDBC Universal Driver
- Step 2: Designate a User Account on the Source IBM DB2 Database
- Step 3: Verify That the Source Database Is Compatible with the Collector
- Step 4: Register the Source IBM DB2 Database with Oracle Audit Vault
- Step 5: Add the DB2DB Collector to Oracle Audit Vault
- Step 6: Enable the Audit Vault Agent to Run the DB2DB Collector
- Step 7: Convert the Binary DB2 Audit File to an ASCII Text File

2.6.1 Step 1: Download the IBM DB2 UDB JDBC Universal Driver

Ensure that you have downloaded the IBM DB2 JDBC Universal Driver for JDBC driver JDBC (`db2jcc.jar`) to the `$ORACLE_HOME/jlib` directories in both the Audit Vault Server and Audit Vault Agent homes. This driver provides high performance native access to IBM DB2 database data sources. Ensure that this jar file is present in

Oracle Audit Vault OC4J before starting the agent OC4J. The DB2 collector uses this driver to collect audit data from IBM DB2 databases.

See Also:

- *Oracle Audit Vault Server Installation Guide for Linux x86* for information about downloading and copying JDBC driver files for IBM DB2
- *Oracle Audit Vault Collection Agent Installation Guide* for information about downloading and copying JDBC driver files for IBM DB2
- *Oracle Audit Vault Collection Agent Installation Guide* to ensure the `sqljdbc.jar` file is present in the Oracle Audit Vault OC4J before starting the agent OC4J

2.6.2 Step 2: Designate a User Account on the Source IBM DB2 Database

Designate an IBM DB2 user account to be used for the `AVDB2DB` utility, which you will use later on to configure collectors for your DB2 database. This user must have privileges to run the IBM DB2 `SYSPROC.ENV_GET_PROD_INFO` procedure.

2.6.3 Step 3: Verify That the Source Database Is Compatible with the Collector

Next, you are ready to verify that the source IBM DB2 database is compatible with the collector type in the collection agent home:

To verify the source IBM DB2 database compatibility:

1. Access either the shell used for the Audit Vault Server or the collection agent.
2. Run the `avdb2db verify` command.

   You must specify the host name and port number. Typically, for IBM DB2, the host is the fully qualified domain name or IP address of the server on which the source DB2 database is running, and the port number is **<need value>**. For example, assuming the host is `hrdb.example.com`, the port number is **<need value>**, the source database is `sales_db`, and the user account is `srcuser_db2`:

   For example:

   ```
   $ avdb2db verify -src hrdb.example.com:50000:sales_db
   Enter a username : srcuser_db2
   Enter a password : password

   ***** Source Verified *****
   ```

   See Section 11.10 for detailed information about the `avdb2db verify` command.
3. Do not close this shell.

2.6.4 Step 4: Register the Source IBM DB2 Database with Oracle Audit Vault

To register the source IBM DB2 database with Oracle Audit Vault:

1. Access the shell used for the Audit Vault Server.
2. Run the `avdb2db add_source` command.

   For example:

   ```
   $ avdb2db add_source -src hrdb.example.com:50000 -srcname db2db4
   ```

```
Enter a username : srcuser_db2
Enter a password : password

***** Source Verified *****
***** Source Added Successfully *****
```

In this example:

- `-src`: Enter the fully qualified domain name (or IP address) and port number for the source database that you verified in Step 3: Verify That the Source Database Is Compatible with the Collector.
- `-srcname`: Create a name for this source database. Oracle Audit Vault refers to this name when it collects audit data.
- `username` and `password`: Enter the user name and password that you designated in Step 2: Designate a User Account on the Source IBM DB2 Database.

See Section 11.3 for detailed information about the `avdb2db add_source` command.

3. Do not close this shell.

2.6.5 Step 5: Add the DB2DB Collector to Oracle Audit Vault

To add the DB2DB collector to Oracle Audit Vault:

1. Access the shell used for the Audit Vault Server.
2. Run the `avdb2db add_collector` command.

For example:

```
$ avdb2db add_collector -srcname db2db4 -agentname agent1
Enter a username :srcuser_db2
Enter a password : password

***** Collector Added Successfully*****
```

In this example:

- `-srcname`: Create a name for the source database. Oracle Audit Vault refers to this name when collecting audit data.
- `-agentname`: Create a name for the agent.
- `username` and `password`: Enter the user name and password that you designated in Step 2: Designate a User Account on the Source IBM DB2 Database.

See Section 11.2 for detailed information about the `avdb2db add_collector` command.

3. Optionally, modify the attributes associated with the collector.

The collector has a set of default attributes. You can modify these by using the `avdb2db alter_collector` command. See Section 11.4.

4. Do not close this shell.

2.6.6 Step 6: Enable the Audit Vault Agent to Run the DB2DB Collector

You now are ready to add the collection agent credentials to the source IBM DB2 database. This process adds the source user credentials to the wallet, creates a database alias in the wallet for the source user, and verifies the connection to the source using the wallet. This way, the Audit Vault agent can run the DB2DB collector. You must complete this step so that the DB2DB collector can start properly.

To enable the Audit Vault agent to run the DB2DB collector:

1. Access the shell used for the Audit Vault collection agent.
2. Run the `avdb2db setup` command.

   For example:

   ```
   $ avsybdb setup -srcname db2db4
   Enter a username :srcuser_db2
   Enter a password : password

   ***** Credentials Successfully added *****
   ```

   In this example:

   - `-srcname`: Enter the source database name that you created in Step 5: Add the DB2DB Collector to Oracle Audit Vault.
   - `username` and `password`: Enter the user name and password that you designated in Step 2: Designate a User Account on the Source IBM DB2 Database.

   See Section 11.9 for detailed information about the `avsybdb setup` command.
3. Do not close this shell.

2.6.7 Step 7: Convert the Binary DB2 Audit File to an ASCII Text File

IBM DB2 creates its audit files in a binary file format that is separate from the DB2 database. You must convert this binary file to an ASCII text file that the Oracle Audit Vault collection agent can read. To accomplish this, you run a script that performs the conversion. After the script completes, it cleans up the text file so that it is easily readable. It creates a new, time-stamped ASCII text file each time you run the script. You must convert the binary file to an ASCII file before each time that Oracle Audit Vault collects audit data from a DB2 database.

- Step 7A: Complete the Preparation Steps
- Step 7B: Run the Conversion Script

2.6.7.1 Step 7A: Complete the Preparation Steps

You must first set the appropriate environment variables and then copy the scripts to a directory where they are accessible.

1. In the server where you installed the source IBM DB2 database, open a shell as the `SYSADM` DB2 user.

   This user must have the `read` privilge on the following directories and the files within them:

   - `$ORACLE_HOME/bin`
   - `$ORACLE_HOME/av/log`
2. Set the following variables:

- ORACLE_HOME
- DB2AUDIT_HOME (this directory points to the main directory that contains the db2audit command)

3. Go to the Oracle Audit Vault agent home directory, that is, $ORACLE_HOME/bin.)
4. Locate the following scripts:
   - **DB2 release 8.2 databases:** DB282ExtractionUtil (for Microsoft Windows, this file is called DB282ExtractionUtil.bat.)
   - **DB2 9.5 release databases:** DB295ExtractionUtil (for Microsoft Windows, this file is called DB295ExtractionUtil.bat.)
5. Copy the script that corresponds to the version of your source DB2 database to a location that is included in the PATH environment variable.
6. Leave this shell open

2.6.7.2 Step 7B: Run the Conversion Script

In the shell you opened in Section 2.6.7.1, run this script or schedule it to run whenever the DB2DB collector needs to retrieve the DB2 audit records.

- **DB2 release 8.2 databases:** Run the script as follows:

  ```
  DB282ExtractionUtil default_DB2_audit_directory
  ```

  Enter the full directory path to the location of the default DB2 audit directory. Typically, this directory is in the following locations:

  – **UNIX:** *DB2_HOME*/sqlib/security/auditdata

  – **Windows:** *DB2HOME*\instance\security\auditdata

  This script creates the ASCII text file in the auditdata directory, using the following format, which indicates the time the file was created:

  ```
  db2audit.instance.log.0.YYYYDDMMHHMMSS.out
  ```

- **DB2 release 9.5 databases:** Run the script as follows:

  ```
  DB295ExtractionUtil default_DB2_audit_directory output_directory
  ```

  In this specification:

  – *default_DB2_audit_directory* is the same as the directory that is used for DB2 release 8.2.

  – *output_directory* is a directory specified by the AVDB2DB alter_collector SINGLE_FILEPATH attribute. See Table 2–1 in Section 11.4 for more information. This file is created in using the db2audit.instance.log.0.YYYYDDMMHHMMSS.out format.

To schedule the script to run automatically, follow these guidelines:

- **Microsoft Windows.** Use the Windows Scheduler. Provide the archive directory path, extraction path (for release 9.5 databases only), and source database name in the scheduled task.
- **Linux.** Use the crontab utility. Provide the same information that you would provide using the parameters described previously when you normally run the script.

This step completes the registration for the source IBM DB2 database and its collector. Next, you must start the collection agent and collector. See Section 2.7 and Section 2.8 for more information.

2.7 Starting the Collection Agents

This section contains:

- Starting the Collection Agents from the Audit Vault Console
- Starting the Collection Agents from a Shell

2.7.1 Starting the Collection Agents from the Audit Vault Console

1. Start the Audit Vault Console.

   From a Web browser, enter the following URL:

   ```
   http://host:port/av
   ```

   In this specification:

   - `host`: The host computer on which you installed the Audit Vault Server.
   - `port`: The port number reserved for the Audit Vault Server.

   If you are unsure of the host and port number values, then enter the following command in the Audit Vault Server shell:

   ```
   $ avctl show_av_status
   ```

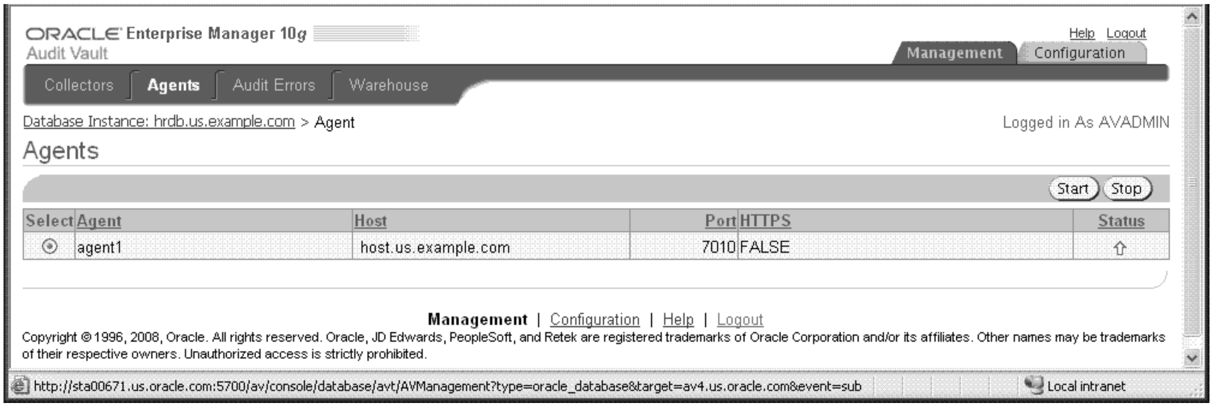
   If the `avctl show_status` command indicates that the Audit Vault Console is not running, enter the following command:

   ```
   $ avctl start_av
   ```

2. Log in as a user who as the `AV_ADMIN` privilege.
3. Select the **Management** tab, and then select the **Agents** subpage.

   The Agents page appears with a grid containing the following columns.

   - **Agent –** Name of the collection agent
   - **Host –** The host name where the collection agent is installed
   - **Port –** The port number of the host system where the collection agent is installed
   - **HTTPS –** Whether or not the collection agent is communicating with the Audit Vault Server using a secure communication channel (HTTPS)
   - **Status –** The current running status of the collection agent: an up green arrow indicates the collection agent is running; a down red arrow indicates the collection agent is not running, or error indicates the collection agent is in an error state



Database Instance: hrdb.us.example.com > Agent

Logged in As AVADMIN

Agents

Select	Agent	Host	Port	HTTPS	Status
●	agent1	host.us.example.com	7010	FALSE	⇧

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http://sta00671.us.oracle.com:5700/av/console/database/avt/AVManagement?type=oracle_database&target=av4.us.oracle.com&event=sub

4. Select the agent that you want to start, and then click **Start**.

2.7.2 Starting the Collection Agents from a Shell

1. Access the shell used for the Audit Vault collection agent.

   If you have closed this shell, reset its environment variables. See Section 2.2.3.

2. Ensure that the agent OC4J is running.

   Run the following AVCTL command in the Oracle Audit Vault Agent home to check its status.

   ```
   $ avctl show_oc4j_status
   ```

3. If the agent OC4J not running, run the `avctl start_oc4j` command.

   ```
   $ avctl start_oc4j
   ```

4. Access the shell used for the Audit Vault Server.

5. Run the `avctl show_agent_status` command to ensure that the collection agent is started.

   (To find the names of existing agents, query the ADM_AGENTS data dictionary view. See Section 13.1.1.)

   For example:

   ```
   $ avctl show_agent_status -agentname agent1

   AVCTL started
   Getting agent metrics...
   --------------------------------
   Agent is not running
   --------------------------------
   Metrics retrieved successfully
   --------------------------------
   ```

6. If the collection agent is not started, run the `avctl start_agent` command.

   For example:

   ```
   $ avctl start_agent -agentname agent1

   AVCTL started
   Executing task start_agent
   Starting Agent...
   ```

```
Agent started successfully.
```

2.8 Starting the Collectors

This section contains:

- Starting the Collectors from the Audit Vault Console
- Starting the Collectors from the Audit Vault Server or Collection Agent Shell

2.8.1 Starting the Collectors from the Audit Vault Console

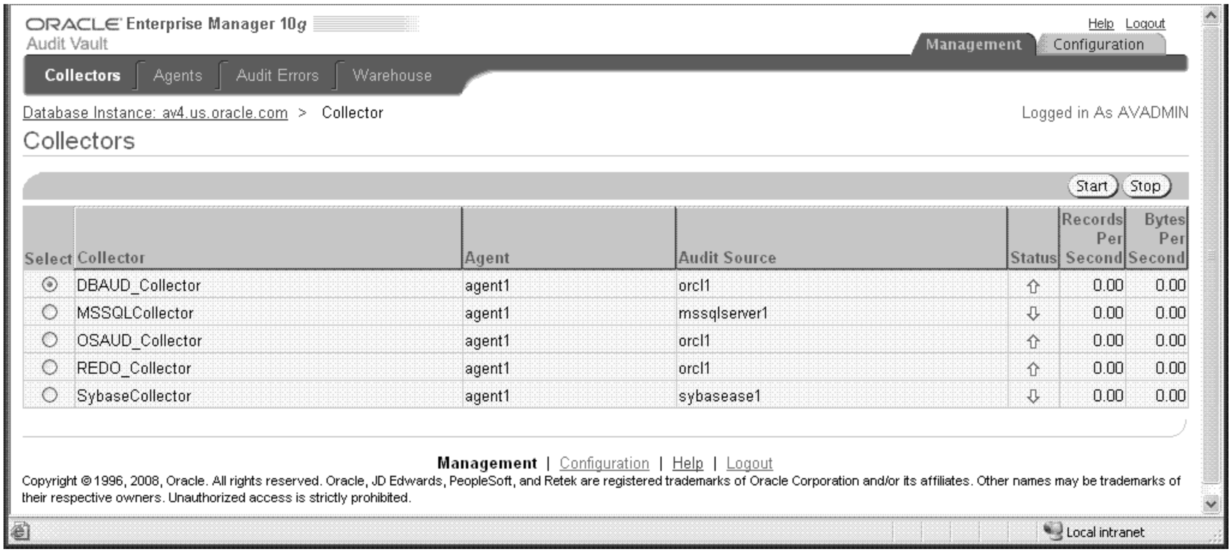
1. Log in to the Audit Vault Console as a user who has been granted the `AV_ADMIN` role.

   See Step 1 in Section 2.7.2 for login instructions.

2. Click the **Management** tab, then **Collectors** to display the **Collectors** page.

   The Collectors page appears with a grid containing the following columns.

   - **Collector** – Name of the collector
   - **Agent** – The name of the collection agent for this collector
   - **Audit Source** – The name of the audit data source
   - **Status** – The current running status of the collector: an up green arrow indicates the collector is running, a down red arrow indicates the collector is not running, an error indicates that the collector is in an error state
   - **Records Per Second** – The number of records per second being collected for the current time period
   - **Bytes Per Second** – The number of bytes per second in audit records being collected for the current time period



Database Instance: av4.us.oracle.com > Collector

Logged in As AVADMIN

Collectors

Select	Collector	Agent	Audit Source	Status	Records Per Second	Bytes Per Second
⦿	DBAUD_Collector	agent1	orcl1	⇧	0.00	0.00
○	MSSQLCollector	agent1	mssqlserver1	⇩	0.00	0.00
○	OSAUD_Collector	agent1	orcl1	⇧	0.00	0.00
○	REDO_Collector	agent1	orcl1	⇧	0.00	0.00
○	SybaseCollector	agent1	sybasease1	⇩	0.00	0.00

Management | Configuration | Help | Logout

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3. Select the collector that you want to start.

   This page also indicates whether the collector is running. A green up arrow indicates the collector is running; a red down arrow indicates it is not running.

4. Click **Start**.

2.8.2 Starting the Collectors from the Audit Vault Server or Collection Agent Shell

To start the collectors from a shell:

1. Access the shell used for the Audit Vault Server or collection agent.

   If you have closed either of these shells, open a new one and reset its environment variables. See the following sections for more information:

   - Section 2.2.2 describes how to set environment variables for the Audit Vault Server.
   - Section 2.2.3 describes how to set environment variables for the collection agent.

2. Ensure that the agent OC4J is running.

   ```
   $ avctl show_oc4j_status
   ```

3. If the agent OC4J is not running, run the `avctl start_oc4j` command.

   ```
   $ avctl start_oc4j
   ```

4. Access the shell used for the Audit Vault Server.

5. Run the `avctl start_collector` command.

   To find the values you must enter for this command, you can query the `ADM_COLLECTORS` data dictionary view. See Section 13.1.3.

   For example:

   ```
   $ avctl start_collector -collname OSAUD_Collector
                           -srcname ORCLSRC1.EXAMPLE.COM
   AVCTL started
   Executing task start_collector
   Starting Collector...
   Collector started successfully.
   ```

   If the start-up is successful, Oracle Audit Vault moves the collector to a `RUNNING` state.

   See Section 7.11 for more information about the `avctl start_collector` command.

2.9 Checking the Status of the Collectors

This section contains:

- Checking the Status of Collectors from the Audit Vault Console
- Checking the Status of Collectors from a Shell

2.9.1 Checking the Status of Collectors from the Audit Vault Console

1. Log in to the Audit Vault Console as a user who has been granted the `AV_ADMIN` role.

   See Step 1 in Section 2.7.2 for login instructions.

2. Select the **Management** tab, and then select the **Collectors** tab.

3. In the Collectors page, check the list of collectors.

If the collector is running, its Status is set to an up arrow. If it is not, it is set to a red arrow pointing downward.

2.9.2 Checking the Status of Collectors from a Shell

To check the status of collectors from a shell:

1. Access the shell used for the Audit Vault Server.

   If you have closed this shell, open a new one and reset its environment variables. See Section 2.2.2.

2. Run the `avctl show_collector_status` command.

   (To find the values you must enter, query the `ADM_COLLECTORS` data dictionary view. See Section 13.1.3.)

   For example:

   ```
   $ avctl show_collector_status -collname OSAUD_Collector
                                 -srcname ORCLSRC1.EXAMPLE.COM
   AVCTL started
   Getting collector metrics...
   --------------------------------
   Collector is running
   Records per second  =  0.00
   Bytes per second  =  0.00
   --------------------------------
   ```

   See Section 7.7 for detailed information about the `avctl show_collector_status` command.

2.10 Checking if the Collectors Are Collecting Audit Records

To ensure that audit records are being collected, inspect the contents of the log files in the Audit Vault collection agent `$ORACLE_HOME/av/log` directory. The log file has the format *`sourcedatabasename_collectorname`*`-%g.log`. The `%g` is a generation number that starts from 0 (zero) and increases once the file size reaches the 10 MB limit. The log file names for command-line utilities are as follows:

- **Oracle Database AVORCLDB utility:** `ORCLDB-%g.log`
- **Microsoft SQL Server AVMSSQLDB utility**: `MSSQLDB-%g.log`
- **Sybase ASE AVSYBDB:** `SYBDB-%g.log`
- **IBM DB2 AVDB2DB utility:** `AVDB2DB-%g.log`

The log file keeps a running record of its audit record collection operations and will indicate when collection has occurred, or if a problem was encountered in the collection operation. See Appendix A for more information about troubleshooting collector setup and start-up collector operations.

3 Managing Oracle Audit Vault

This chapter contains:

- About Managing Oracle Audit Vault
- Managing the Audit Vault Server
- Altering Collector Properties and Attributes
- Managing the Oracle Audit Vault Data Warehouse
- Altering Source Database Attributes
- Removing Source Databases from Oracle Audit Vault

3.1 About Managing Oracle Audit Vault

This chapter describes common management activities that you need to perform after you have completed the configuration tasks in Chapter 2, "Registering Source Databases and Collectors." You can use the Audit Vault Console or the command-line tools described in this chapter to manage Oracle Audit Vault.

3.2 Managing the Audit Vault Server

This section contains:

- About Managing the Audit Vault Console
- Checking the Audit Vault Console Status
- Starting the Audit Vault Console
- Stopping the Audit Vault Server Console
- Globally Disabling and Enabling Alert Settings
- Viewing Audit Event Categories
- Viewing Oracle Audit Vault Errors

3.2.1 About Managing the Audit Vault Console

The Audit Vault Console is a graphical user interface that you can use to perform commonly used Audit Vault administration tasks. If you prefer to use a command line interface, you can use equivalent commands in the `AVCA` and `AVCTL` utilities.

3.2.2 Checking the Audit Vault Console Status

To check the status of the Audit Vault Console:

1. Open a shell for the Audit Vault Server.
2. Follow the instructions in Section 2.2.2 to set the environment variables for the Audit Vault Server.
3. Run the following command:

   ```
   $ avctl show_av_status
   ```

3.2.3 Starting the Audit Vault Console

To start the Audit Vault Console:

1. In a shell for the Audit Vault Server, ensure that you have set its environment variables.

   See Section 2.2.2 for more information.
2. Run the following command:

   ```
   $ avctl start_av
   ```

At this stage, you can log in to the Audit Vault Console.

1. From a Web browser, enter the following URL:

   ```
   http://host:port/av
   ```

   In this specification:

   - *host*: The host computer on which you installed the Audit Vault Server.
   - *port*: The port number reserved for the Audit Vault Server.

   If you are unsure of the host and port number values, then enter the `avctl show_av_status` command, which displays this information.
2. In the Login page, enter the following information:

   - **User Name**: Enter the name of a user who has been granted the `AV_ADMIN` role.
   - **Password**: Enter the user's password.
   - **Connect As**: From the list, select **AV_ADMIN**.
3. Click **Login**.

3.2.4 Stopping the Audit Vault Server Console

To stop the Audit Vault Server console:

1. In a shell for the Audit Vault Server, ensure that you have set its environment variables.

   See Section 2.2.2 for more information.
2. Run the following command:

   ```
   $ avctl stop_av
   ```

3.2.5 Globally Disabling and Enabling Alert Settings

If you need to perform maintenance tasks or other similar activities that do not require alert settings to be active, you can globally enable or disable the alert settings that Oracle Audit Vault auditors create. Do not disable alerts unless you are directed to do so by Oracle Support or if you encounter a problem with the alerts table. By default, alerts are enabled.

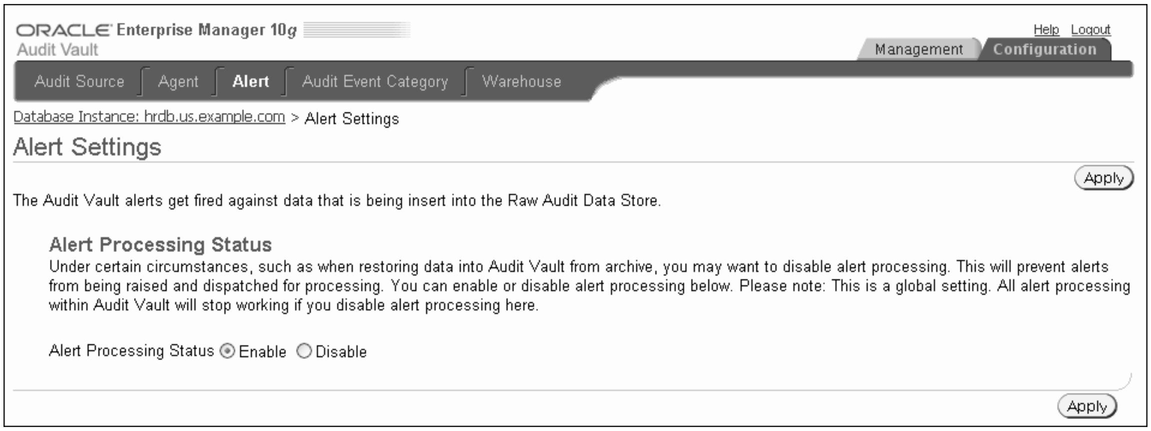
To globally disable and enable alerts:

1. Log in to the Audit Vault Console as a user who has been granted the `AV_ADMIN` role.

   See Section 3.2.3 for login instructions.

2. Select the **Configuration** tab, and then select the **Alert** subpage.

   The Alert Settings page appears.



Database Instance: hrdb.us.example.com > Alert Settings

Alert Settings

The Audit Vault alerts get fired against data that is being insert into the Raw Audit Data Store.

Alert Processing Status

Under certain circumstances, such as when restoring data into Audit Vault from archive, you may want to disable alert processing. This will prevent alerts from being raised and dispatched for processing. You can enable or disable alert processing below. Please note: This is a global setting. All alert processing within Audit Vault will stop working if you disable alert processing here.

Alert Processing Status ● Enable ○ Disable

3. At the Alert Processing Status label, select either **Disable** or **Enable**.

4. Click **Apply**.

3.2.6 Viewing Audit Event Categories

Audit event category management consists of viewing the Audit Vault audit event categories, their attributes, and their audited events.

1. Log in to the Audit Vault Console as a user who has been granted the `AV_ADMIN` role.

   See Section 3.2.3 for login instructions.

2. Select the **Configuration** tab, and then select the **Audit Event Category** subpage.

   The Audit Event Category Management page appears.

3. Select an audit event category, and then click **View** to find detailed information about that category.

   The View Audit Event Category page appears.

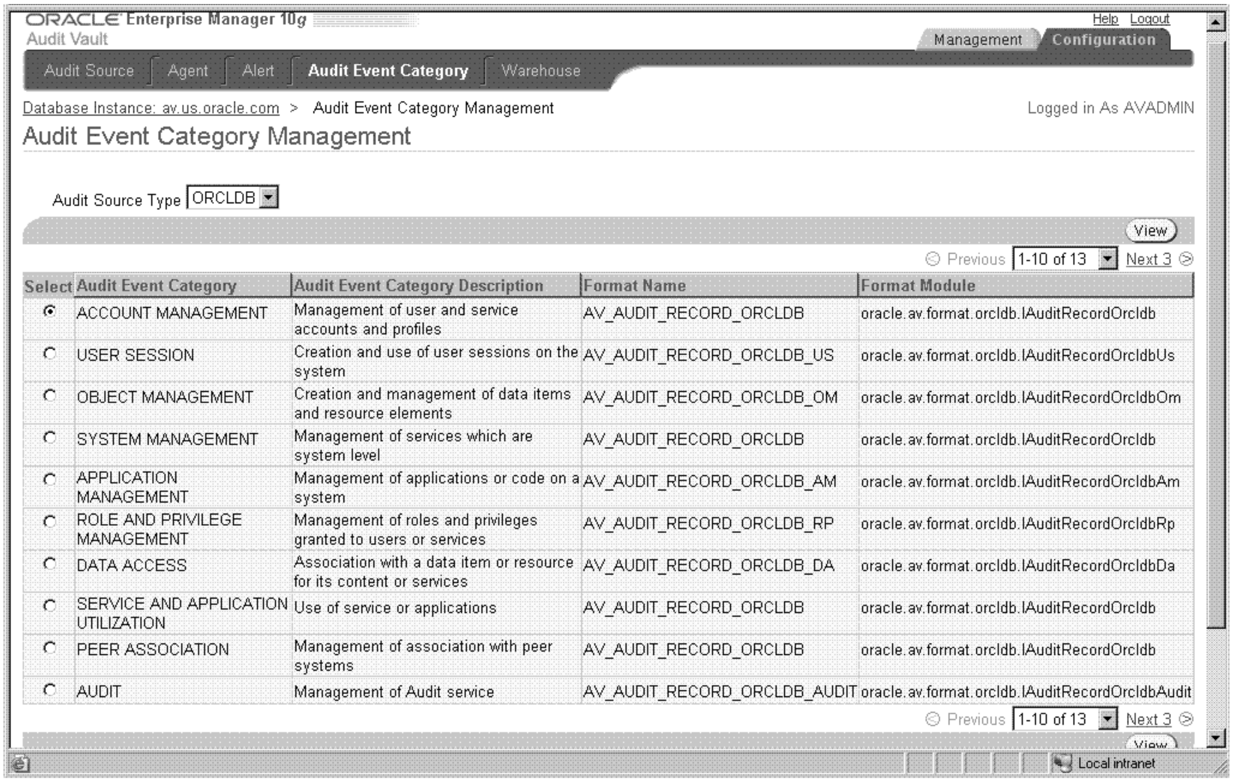
4. From the **Audit Source Type** list, select from the available source types: **ORCLDB**, **MSSQLDB**, **SYBDB**, and **DB2DB**.

5. Select the **Attributes** or **Audit Events** subpages to view detailed information about these categories.

6. Click **OK** when you complete viewing the audit event information for the category you selected.

Figure 3–1 shows the Audit Event Category Management page.

Figure 3–1 Audit Event Category Management Page



Database Instance: av.us.oracle.com > Audit Event Category Management

Logged in As AVADMIN

Audit Event Category Management

Audit Source Type ORCLDB

Select	Audit Event Category	Audit Event Category Description	Format Name	Format Module
●	ACCOUNT MANAGEMENT	Management of user and service accounts and profiles	AV_AUDIT_RECORD_ORCLDB	oracle.av.format.orcldb.IAuditRecordOrcldb
○	USER SESSION	Creation and use of user sessions on the system	AV_AUDIT_RECORD_ORCLDB_US	oracle.av.format.orcldb.IAuditRecordOrcldbUs
○	OBJECT MANAGEMENT	Creation and management of data items and resource elements	AV_AUDIT_RECORD_ORCLDB_OM	oracle.av.format.orcldb.IAuditRecordOrcldbOm
○	SYSTEM MANAGEMENT	Management of services which are system level	AV_AUDIT_RECORD_ORCLDB	oracle.av.format.orcldb.IAuditRecordOrcldb
○	APPLICATION MANAGEMENT	Management of applications or code on a system	AV_AUDIT_RECORD_ORCLDB_AM	oracle.av.format.orcldb.IAuditRecordOrcldbAm
○	ROLE AND PRIVILEGE MANAGEMENT	Management of roles and privileges granted to users or services	AV_AUDIT_RECORD_ORCLDB_RP	oracle.av.format.orcldb.IAuditRecordOrcldbRp
○	DATA ACCESS	Association with a data item or resource for its content or services	AV_AUDIT_RECORD_ORCLDB_DA	oracle.av.format.orcldb.IAuditRecordOrcldbDa
○	SERVICE AND APPLICATION UTILIZATION	Use of service or applications	AV_AUDIT_RECORD_ORCLDB	oracle.av.format.orcldb.IAuditRecordOrcldb
○	PEER ASSOCIATION	Management of association with peer systems	AV_AUDIT_RECORD_ORCLDB	oracle.av.format.orcldb.IAuditRecordOrcldb
○	AUDIT	Management of Audit service	AV_AUDIT_RECORD_ORCLDB_AUDIT	oracle.av.format.orcldb.IAuditRecordOrcldbAudit

On the **Audit Event Category Management** page, audit event categories appear in tabular format, showing the following columns:

- Audit Event Category
- Audit Event Category Description
- Format Name
- Format Module

3.2.7 Viewing Oracle Audit Vault Errors

You can use the Audit Vault Console to view operational errors that Oracle Audit Vault catches, such as broken database connections and missing files.

To view Oracle Audit Vault errors:

1. Log in to the Audit Vault Console as a user who has been granted the `AV_ADMIN` role.

   See Section 3.2.3 for login instructions.

2. Select the **Management** tab, and then select the **Audit Errors** subpage.

   The Audit Errors page appears.

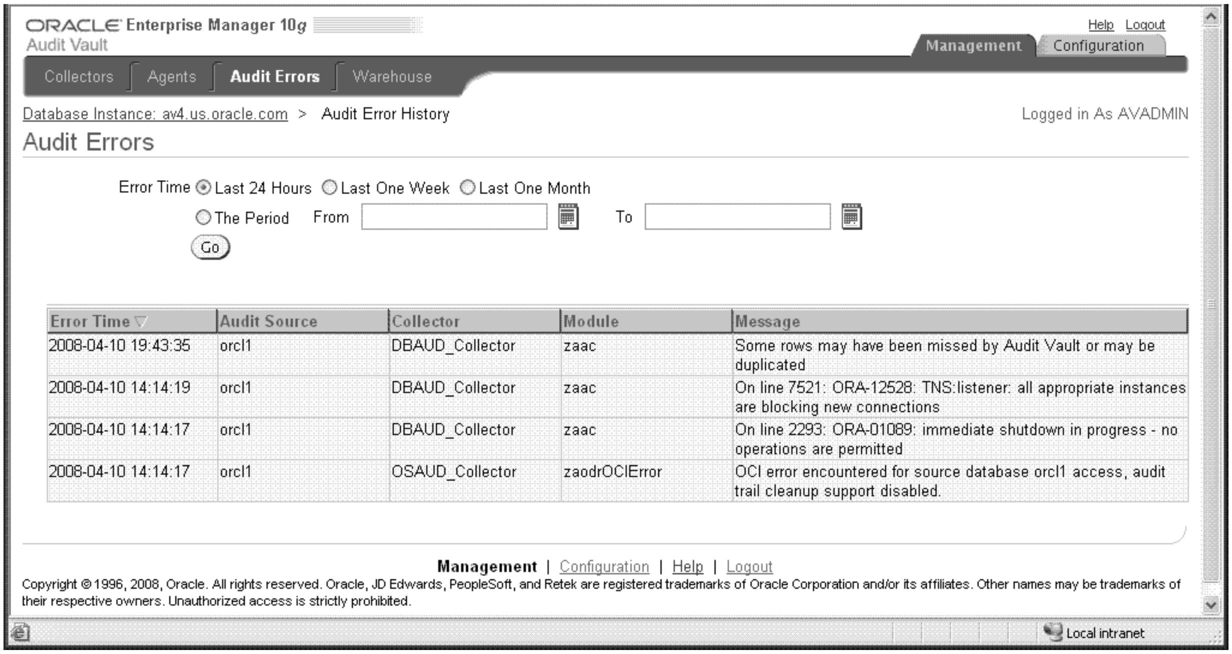
3. After the Error Time label, specify a time range of errors to view.

Select from the **Last 24 Hours**, **Last One Week**, or **Last One Month** options to view errors from those times, or select **The Period** and then enter a start date in the **From** field and end date in the **To** field if you want to specify a different range of time.

4. Click **Go**.

Figure 3–2 shows the Audit Errors page with audit errors from the last 24 hours.

Figure 3–2 Audit Errors Page



Database Instance: av4.us.oracle.com > Audit Error History

Logged in As AVADMIN

Audit Errors

Error Time ● Last 24 Hours ○ Last One Week ○ Last One Month

○ The Period From ______ To ______

Error Time ▽	Audit Source	Collector	Module	Message
2008-04-10 19:43:35	orcl1	DBAUD_Collector	zaac	Some rows may have been missed by Audit Vault or may be duplicated
2008-04-10 14:14:19	orcl1	DBAUD_Collector	zaac	On line 7521: ORA-12528: TNS:listener: all appropriate instances are blocking new connections
2008-04-10 14:14:17	orcl1	DBAUD_Collector	zaac	On line 2293: ORA-01089: immediate shutdown in progress - no operations are permitted
2008-04-10 14:14:17	orcl1	OSAUD_Collector	zaodrOCIError	OCI error encountered for source database orcl1 access, audit trail cleanup support disabled.

Management | Configuration | Help | Logout

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The **Audit Errors** page displays error information in tabular format with the following column headings:

- **Error Time** – Local time when the audit error was generated
- **Audit Source** – The audit source database on which the audit error originated
- **Collector** – The collector on which the audit error originated
- **Module** – The module name involved in the audit error
- **Message** – The content of the audit error message

3.3 Altering Collector Properties and Attributes

This section contains:

- About Collector Properties and Attributes
- Altering Collector Properties and Attributes Using the Audit Vault Console
- Altering Collector Properties and Attributes Using a Shell

3.3.1 About Collector Properties and Attributes

After you add a collector to a database source, Oracle Audit Vault creates the collector with a set of default properties that are internal to Oracle Audit Vault. They have no affect on the source database. These properties control aspects such as the frequency of when the collector collects audit data from the source database, the name of the source database, and so on. You can find the current attributes for a collector by querying the ADM_COLLECTORTYPE_ATTRDEFS data dictionary view, described in Section 13.1.4.

3.3.2 Altering Collector Properties and Attributes Using the Audit Vault Console

To alter collector properties and attributes using the Audit Vault Console:

1. Log in to the Audit Vault Console as a user who has been granted the AV_ADMIN role.

   See Section 3.2.3 for login instructions.

2. Select the **Configuration** tab, and then select the **Audit Source** subpage.

   The Source Configuration Management page appears.

3. Select the **Collector** subpage.

   The Collector Configuration Management page appears, which displays the current settings for the available collectors.

4. Select the collector that you want to modify, and then click the **Edit** button.

   The Edit Collector page appears.

5. Under Attributes, modify the attributes for the collectors by editing the values in the Value column.

   For more information about these attributes, see the following sections:

   - Section 8.4 for the Oracle Database collector attributes
   - Section 9.4 for the SQL Server collector attributes
   - Section 10.4 for the Sybase ASE collector attributes
   - Section 10.4 for the IBM DB2 collector attributes

6. Click **OK**.

3.3.3 Altering Collector Properties and Attributes Using a Shell

To alter collector properties using a shell:

1. In a shell for the Audit Vault Server, ensure that you have set its environment variables.

   See Section 2.2.2 for more information.

2. Run the alter_collector command for the each collector type.

   To find the names and attributes of existing collectors, query the ADM_COLLECTORTYPE_ATTRDEFS data dictionary, described in Section 13.1.4.

   Examples are as follows:

   For Oracle Database:

   ```
   $ avorcldb alter_collector -srcname hrdb.example.com -collname DBAUD_Collector
   AUDAUDIT_DELAY_TIME=60
   ```

   See Section 8.4 for more information about the avorldb alter_collector command.

   For Microsoft SQL Server:

   ```
   $ avmssqldb alter_collector -srcname mssqldb4 -collname MSSQLCollector NO_OF_
   ```

```
RECORDS=1500 DESCRIPTION="MSSQLDB collector 45" SERVER_SIDE_
FILPATH="c:\SQLAuditFile*
```

See Section 9.4 for more information about the `avmssqldb alter_collector` command.

For Sybase ASE:

```
$ avsybdb alter_collector -srcname sybdb4 -collname SybaseCollector
NO_OF_RECORDS=1500 DESCRIPTION="Sybase collector 45"
```

See Section 10.4 for more information about the `avsybdb alter_collector` command.

For IBM DB2:

```
$ avdb2db alter_collector -srcname db2db4 -collname DB2Collector
NO_OF_RECORDS=1500 DESCRIPTION="IBM DB2 collector 9"
```

See Section 11.4 for more information about the `avdb2db alter_collector` command.

3.4 Managing the Oracle Audit Vault Data Warehouse

This section contains:

- About Managing the Oracle Audit Vault Data Warehouse
- Setting the Audit Vault Data Warehouse Refresh Schedule and Retention Period
- Manually Refreshing Audit Vault Data Warehouse Audit Data
- Loading Data to the Oracle Audit Vault Data Warehouse
- Purging Data from the Oracle Audit Vault Data Warehouse

3.4.1 About Managing the Oracle Audit Vault Data Warehouse

The collectors send audit data from their source databases to the Oracle Audit Vault data warehouse. From there, the Audit Vault Server populates generated Audit Vault reports with data from this audit data.

You can perform the following activities with the Oracle Audit Vault data warehouse:

- **Set the Audit Vault data warehouse refresh schedule.** This schedule determines how often Oracle Audit Vault retrieves raw audit data from the collectors.
- **Set a retention period for the data that has been refreshed.** You can create a window of time for the audit data that you retrieve, for example, all audit records created from a year ago to the current refresh date.
- **Load older data from the raw audit data store into the data warehouse tables.** This enables the audit data to be available for analysis.
- **Purge audit data.** You can delete audit data that is stored in the data warehouse.

3.4.2 Setting the Audit Vault Data Warehouse Refresh Schedule and Retention Period

This section contains:

- About Setting the Refresh Schedule and Retention Period
- Creating the Refresh Schedule and Retention Period Using the Audit Vault Console

- Creating the Refresh Schedule and Retention Period Using a Shell

3.4.2.1 About Setting the Refresh Schedule and Retention Period

The refresh schedule determines when Oracle Audit Vault collects raw audit data from its source databases. Oracle Audit Vault places the refreshed data in the `AUDIT_EVENT_FACT` table. (*Oracle Audit Vault Auditor's Guide* describes the schema of this table.) By default, Audit Vault collects this data once every 24 hours. You can set a retention period that determines the size of a sliding window of time for the `AUDIT_EVENT_FACT` table to hold this audit data.

The refresh schedule and retention period work together as follows: Suppose you have configured two source databases with Oracle Audit Vault. One database has four years of audit data accumulated and the other has three years of audit data. You want to retain only exactly the last year of data after each refresh takes place. To accomplish this, do the following:

1. Schedule the refresh to start on a given day. For example, assuming today is August 8, 2008, you set it for today.
2. Specify a frequency of once a day for the refresh to occur.
3. Set the retention period to one year. This retention period refers to the year before August reached its eighth day in the year 2008.

When the first refresh takes place, Oracle Audit Vault retrieves the audit data that began one year ago, starting on August 8, 2007, to the current date, August 8, 2008. When the next refresh takes place on August 9, 2008, only the new audit data is retrieved. The retention period shifts forward: now this period is from August 9, 2007, to August 9, 2008. Oracle Audit Vault then discards the audit data from August 8, 2007, because now it is older than the retention period. This way, you always have the most recent year of audit data, right up to the current date.

There are two ways that you can create a refresh schedule:

- **Create the schedule once, directly in Oracle Audit Vault.** The schedule settings remain in place until the next time you modify these settings.
- **Create one or more predefined schedules by using the DBMS_SCHEDULER PL/SQL package.** You can create this schedule in SQL*Plus (or other SQL tool such as SQL Developer). Afterward, you use Oracle Audit Vault to select the schedule that you want to use. For more information about the `DBMS_SCHEDULER` package, see *Oracle Database PL/SQL Packages and Types Reference*.

You can create a schedule and retention period from either the Audit Vault Console or at a shell by using the `AVCA` or `AVCTL` utilities.

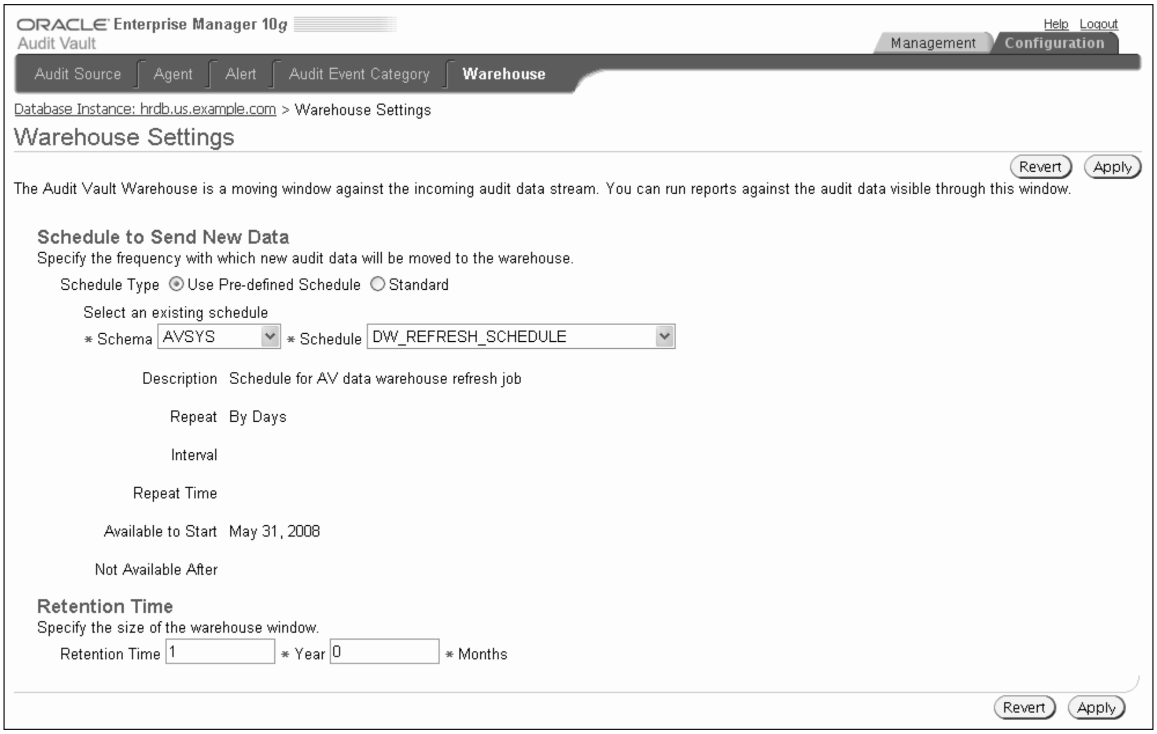
3.4.2.2 Creating the Refresh Schedule and Retention Period Using the Audit Vault Console

To create the refresh schedule and retention period using the Audit Vault Console:

1. Log in to the Audit Vault Console as a user who has been granted the `AV_ADMIN` role.

   See Section 3.2.3 for login instructions.
2. Select the **Management** tab, and then select the **Warehouse** subpage.

   The Warehouse Settings page appears.



Warehouse Settings

The Audit Vault Warehouse is a moving window against the incoming audit data stream. You can run reports against the audit data visible through this window.

Schedule to Send New Data

Specify the frequency with which new audit data will be moved to the warehouse.

Schedule Type ● Use Pre-defined Schedule ○ Standard

Select an existing schedule

* Schema AVSYS * Schedule DW_REFRESH_SCHEDULE

Description Schedule for AV data warehouse refresh job

Repeat By Days

Interval

Repeat Time

Available to Start May 31, 2008

Not Available After

Retention Time

Specify the size of the warehouse window.

Retention Time 1 * Year 0 * Months

3. Either select an existing schedule or create a new one.

   To select an existing schedule:

   a. Under Schedule to Send New Data, select **Use Pre-defined Schedule**.

   b. From the **Schema** list, select the name of the schema in which the schedule was created.

   c. From the **Schedule** list, select the name of the schedule.

      Information about the schedule appears: a brief description, repeat times, interval, repeat time, and start and end dates. If settings have been omitted (for example, an interval time), then these labels are blank.

   To create a new, standard schedule:

   a. Under Schedule to Send New Data, select **Standard**.

   b. Enter the following information:

      Frequency Type: From the list, select a frequency type, such as **By Hours**.

      Interval (*frequency type*): Enter the frequency for the type of frequency you selected. For example, `1` for once every hour.

      Start Date: Specify the date on which the refresh occurs. If you select a date that is earlier than today's date, then the refresh takes place today.

      Start Time: Enter the time on which the refresh occurs.

4. Set the retention window, that is, the period of time during which the data sent to the Audit Vault data warehouse remains in storage.

   For example, suppose you scheduled Oracle Audit Vault to refresh the raw audit data store every 2 hours, starting on August 19, 2008 at 2 a.m., and you want to keep this data in the in storage for the next year and a half. To do so, you would enter `1` in the **Year** field and `6` in the **Months** field.

5. Click **Apply**.

3.4.2.3 Creating the Refresh Schedule and Retention Period Using a Shell

To create the refresh schedule and retention period using a shell:

1. In a shell for the Audit Vault Server, ensure that you have set its environment variables.

   See Section 2.2.2 for more information.

2. Run the `avca set_warehouse_schedule` command to either specify an existing schedule or to create a new one.

   For example, to select an existing schedule named `daily_refresh`:

   ```
   $ avca set_warehouse_schedule -schedulename daily_refresh'
   ```

   To create a new schedule:

   ```
   $ avca set_warehouse_schedule -startdate 01-JUL-06 -rptintrv
   'FREQ=DAILY;BYHOUR=0'
   ```

   In this example:

   - `startdate`: Specifies the date for the first refresh to begin.
   - `rptintrv`: Specifies the intervals for the refreshes, in this case, once a day.

   See Section 6.14 for more information about the `avca set_warehouse_schedule` command.

3. Run the `avca set_warehouse_retention` command to set the retention period.

   For example, specify a period of one year and 6 months, enter the following command:

   ```
   $ avca set_warehouse_retention -intrv +01-06
   ```

   See Section 6.13 for more information about the `avca set_warehouse_retention` command.

3.4.3 Manually Refreshing Audit Vault Data Warehouse Audit Data

This section contains:

- About Manually Refreshing the Data Warehouse Data
- Manually Refreshing the Data Warehouse Using the Audit Vault Console
- Manually Refreshing the Data Warehouse Using a Shell

3.4.3.1 About Manually Refreshing the Data Warehouse Data

You can refresh the Oracle Audit Vault data warehouse repository with data from the raw audit data store. As with a scheduled refresh, Oracle Audit Vault collects the raw audit data from its source databases and places it into the Audit Vault data warehouse `AUDIT_EVENT_FACT` table.

3.4.3.2 Manually Refreshing the Data Warehouse Using the Audit Vault Console

When you manually refresh the data in the Audit Vault data warehouse, you also can check the history of when refresh operations took place.

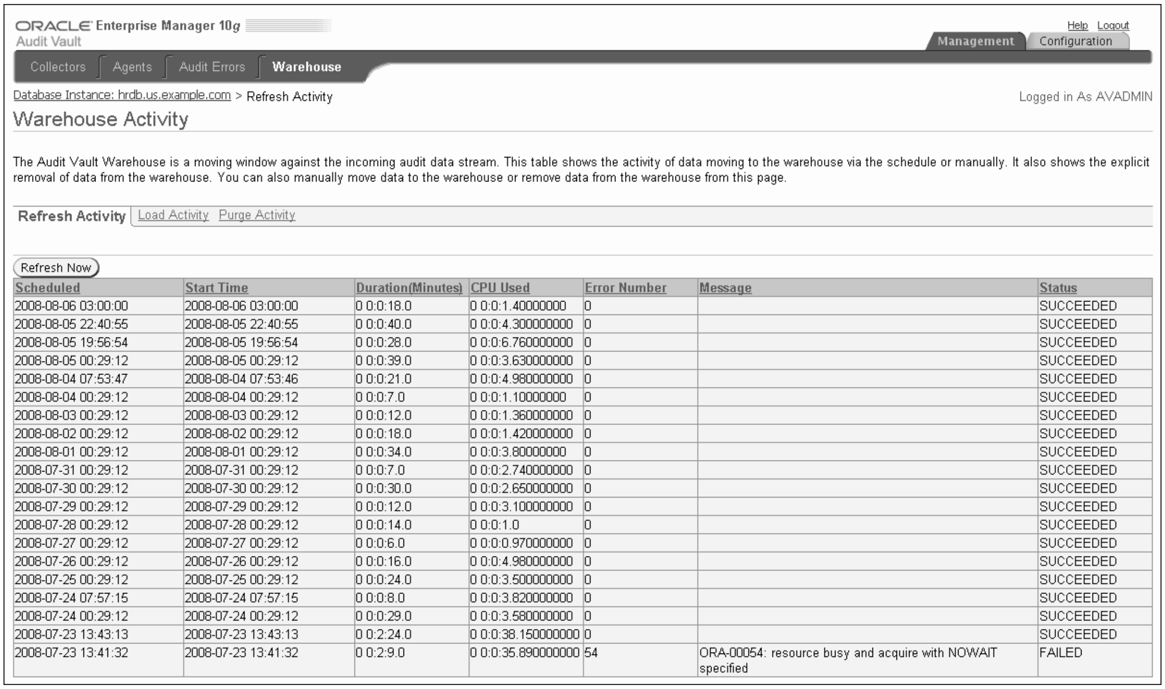
To manually refresh the data warehouse using the Audit Vault Console:

1. Log in to the Audit Vault Console as a user who has been granted the `AV_ADMIN` role.

   See Section 3.2.3 for login instructions.

2. Select the **Management** tab, and then select the **Warehouse** subpage.

   The Warehouse Activity page appears.



Warehouse Activity

The Audit Vault Warehouse is a moving window against the incoming audit data stream. This table shows the activity of data moving to the warehouse via the schedule or manually. It also shows the explicit removal of data from the warehouse. You can also manually move data to the warehouse or remove data from the warehouse from this page.

Scheduled	Start Time	Duration(Minutes)	CPU Used	Error Number	Message	Status
2008-08-06 03:00:00	2008-08-06 03:00:00	0 0:0:18.0	0 0:0:1.40000000	0		SUCCEEDED
2008-08-05 22:40:55	2008-08-05 22:40:55	0 0:0:40.0	0 0:0:4.300000000	0		SUCCEEDED
2008-08-05 19:56:54	2008-08-05 19:56:54	0 0:0:28.0	0 0:0:6.760000000	0		SUCCEEDED
2008-08-05 00:29:12	2008-08-05 00:29:12	0 0:0:39.0	0 0:0:3.630000000	0		SUCCEEDED
2008-08-04 07:53:47	2008-08-04 07:53:46	0 0:0:21.0	0 0:0:4.980000000	0		SUCCEEDED
2008-08-04 00:29:12	2008-08-04 00:29:12	0 0:0:7.0	0 0:0:1.10000000	0		SUCCEEDED
2008-08-03 00:29:12	2008-08-03 00:29:12	0 0:0:12.0	0 0:0:1.360000000	0		SUCCEEDED
2008-08-02 00:29:12	2008-08-02 00:29:12	0 0:0:18.0	0 0:0:1.420000000	0		SUCCEEDED
2008-08-01 00:29:12	2008-08-01 00:29:12	0 0:0:34.0	0 0:0:3.80000000	0		SUCCEEDED
2008-07-31 00:29:12	2008-07-31 00:29:12	0 0:0:7.0	0 0:0:2.740000000	0		SUCCEEDED
2008-07-30 00:29:12	2008-07-30 00:29:12	0 0:0:30.0	0 0:0:2.650000000	0		SUCCEEDED
2008-07-29 00:29:12	2008-07-29 00:29:12	0 0:0:12.0	0 0:0:3.100000000	0		SUCCEEDED
2008-07-28 00:29:12	2008-07-28 00:29:12	0 0:0:14.0	0 0:0:1.0	0		SUCCEEDED
2008-07-27 00:29:12	2008-07-27 00:29:12	0 0:0:6.0	0 0:0:0.970000000	0		SUCCEEDED
2008-07-26 00:29:12	2008-07-26 00:29:12	0 0:0:16.0	0 0:0:4.980000000	0		SUCCEEDED
2008-07-25 00:29:12	2008-07-25 00:29:12	0 0:0:24.0	0 0:0:3.500000000	0		SUCCEEDED
2008-07-24 07:57:15	2008-07-24 07:57:15	0 0:0:8.0	0 0:0:3.820000000	0		SUCCEEDED
2008-07-24 00:29:12	2008-07-24 00:29:12	0 0:0:29.0	0 0:0:3.580000000	0		SUCCEEDED
2008-07-23 13:43:13	2008-07-23 13:43:13	0 0:2:24.0	0 0:0:38.150000000	0		SUCCEEDED
2008-07-23 13:41:32	2008-07-23 13:41:32	0 0:2:9.0	0 0:0:35.890000000	54	ORA-00054: resource busy and acquire with NOWAIT specified	FAILED

   The Data Warehouse Activity page shows the following information:

   - **Scheduled –** The scheduled time to perform a refresh operation
   - **Start Time –** The start time when a refresh operation started
   - **Duration (Minutes) –** The total time required to complete a refresh operation
   - **CPU Used –** The amount of time used to complete a refresh operation
   - **Error Number –** The Oracle ORA- error number, if any, resulting from a refresh operation
   - **Message –** Any error messages, if any, resulting from a refresh operation
   - **Status –** The current status of a refresh operation: FAILED or SUCCEEDED

3. Click the **Refresh Now** button.

3.4.3.3 Manually Refreshing the Data Warehouse Using a Shell

To manually refresh the data warehouse using a shell:

1. In a shell for the Audit Vault Server, ensure that you have set its environment variables.

   See Section 2.2.2 for more information.

2. Run the `avctl refresh_warehouse` command.

For example:

```
$ avctl refresh_warehouse -wait

AVCTL started
Refreshing warehouse...
Waiting for refresh to complete...
done.
```

The `-wait` parameter delays refreshing the raw data store until the current refresh job (if there is one taking place) completes. See Section 7.4 for more information about the `avctl refresh_warehouse` command.

3.4.4 Loading Data to the Oracle Audit Vault Data Warehouse

This section contains:

- About Loading Data to the Oracle Audit Vault Warehouse
- Loading Data Warehouse Data Using the Audit Vault Console
- Loading Data Warehouse Data Using a Shell

3.4.4.1 About Loading Data to the Oracle Audit Vault Warehouse

You can load data that is older than the retention period from the raw audit data store into the Audit Vault data warehouse tables. After you load this data, it is ready for auditors to generate reports or perform analysis.

To find the current retention period setting, view the Warehouse Settings page of the Audit Vault Console (see Section 3.4.2); to find the last time the data was refreshed, view the Warehouse Activity page (Section 3.4.3).

3.4.4.2 Loading Data Warehouse Data Using the Audit Vault Console

To load the data warehouse data using the Audit Vault Console:

1. Log in to the Audit Vault Console as a user who has been granted the `AV_ADMIN` role.

   See Section 3.2.3 for login instructions.

2. Optionally, disable the alert settings.

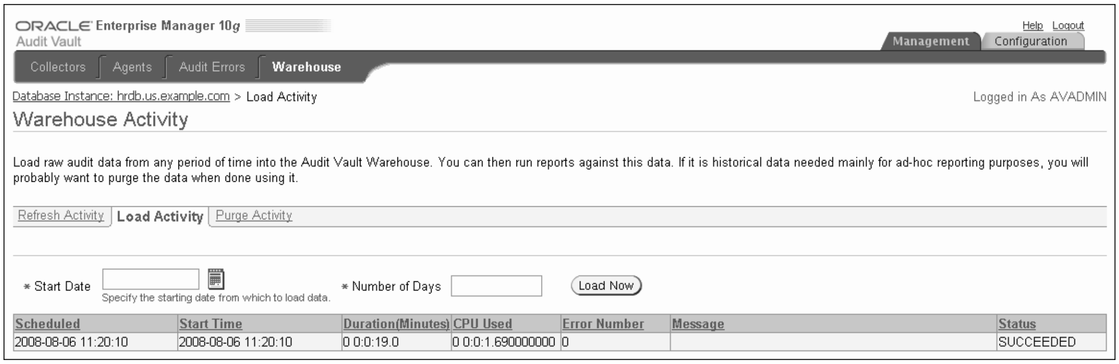
   See Section 3.2.5 for more information.

3. Select the **Management** tab, and then select the **Warehouse** subpage.

   The Warehouse Activity page appears.

4. Select the **Load Activity** subpage.

   The Load Activity page appears.



Database Instance: hrdb.us.example.com > Load Activity

Logged in As AVADMIN

Warehouse Activity

Load raw audit data from any period of time into the Audit Vault Warehouse. You can then run reports against this data. If it is historical data needed mainly for ad-hoc reporting purposes, you will probably want to purge the data when done using it.

Specify the starting date from which to load data.

Scheduled	Start Time	Duration(Minutes)	CPU Used	Error Number	Message	Status
2008-08-06 11:20:10	2008-08-06 11:20:10	0 0:0:19.0	0 0:0:1.690000000	0		SUCCEEDED

5. In the **Start Date** field, enter the beginning date of the data that you want to load. For example, suppose the source database contains audit data that is 10 years old, and you want to load the last 5 years' worth of audit data into the Audit Vault data warehouse. Assuming today's date is August 8, 2008, you would specify August 8, 2003 as the start date.

6. In the **Number of Days** field, enter the number of days, starting from the start date, through which you want to load data.

7. Click the **Load Now** button.

   Oracle Audit Vault schedules the data load operation, which is listed on this page the next time you access it.

8. Re-enable the alert settings if you had disabled them.

   See Section 3.2.5 for more information.

3.4.4.3 Loading Data Warehouse Data Using a Shell

To load the data warehouse data using a shell:

1. Optionally, disable the alert settings.

   See Section 3.2.5 for more information.

2. In a shell for the Audit Vault Server, ensure that you have set its environment variables.

   See Section 2.2.2 for more information.

3. Run the `avctl load_warehouse` command.

   For example, to load 10 days' of audit data that was recorded starting on August 8, 2003, enter the following command:

   ```
   $ avctl load_warehouse -startdate 08-AUG-03 -numofdays 10
   ```

   See Section 7.2 for more information about the `avctl load_warehouse` command.

4. Re-enable the alert settings if you had disabled them.

   See Section 3.2.5 for more information.

3.4.5 Purging Data from the Oracle Audit Vault Data Warehouse

This section contains:

- About Purging the Oracle Audit Vault Data Warehouse
- Purging Data Warehouse Data Using the Audit Vault Console
- Purging Data Warehouse Data Using a Shell

3.4.5.1 About Purging the Oracle Audit Vault Data Warehouse

When you no longer need the audit data that you have loaded into Audit Vault Server, you can remove it from the Audit Vault data warehouse. If in the future you decide that you need to run reports against this purged data, follow the instructions in Section 3.4.4 to reload the necessary data back into the data warehouse. You can only remove data that is that is older than the retention period. You can find and reset the retention period from the Audit Vault Console Warehouse Settings page (see Section 3.4.2).

3.4.5.2 Purging Data Warehouse Data Using the Audit Vault Console

To purge the data warehouse data using the Audit Vault Console:

1. Log in to the Audit Vault Console as a user who has been granted the `AV_ADMIN` role.

   See Section 3.2.3 for login instructions.

2. Select the **Management** tab, and then select the **Warehouse** subpage.

   The Warehouse Activity page appears.

3. Select the Purge Activity subpage.

   The Purge Activity subpage appears.

4. In the **Start Date** field, enter the beginning date of the data that you want to purge.

5. In the **Number of Days** field, enter the number of days, starting from the start date, through which you want to purge data.

6. Click the **Purge Now** button.

   Oracle Audit Vault schedules the data load operation, which is listed on this page the next time you access it.

3.4.5.3 Purging Data Warehouse Data Using a Shell

To purge the data warehouse data using a shell:

1. In a shell for the Audit Vault Server, ensure that you have set its environment variables.

   See Section 2.2.2 for more information.

2. Run the `avctl purge_warehouse` command.

   For example, to purge 10 days' of audit data that was recorded starting on January 1, 2004, and to specify that the operation wait until the previous purge job completes, enter the following command:

   ```
   $ avctl purge_warehouse -startdate 01-JAN-04 -numofdays 10 -wait
   ```

   See Section 7.2 for more information about the `avctl load_warehouse` command.

3.5 Altering Source Database Attributes

This section contains:

- About Source Database Attributes
- Altering Source Database Attributes Using the Audit Vault Console
- Altering Source Database Attributes Using a Shell

3.5.1 About Source Database Attributes

After you register a source database, Oracle Audit Vault creates a set of properties that reflect general aspects of the source database itself, such as its port number and IP address. These properties are internal to Oracle Audit Vault and have no affect on the source database. You can find the current attributes for a source database by querying the ADM_SOURCE_ATTRIBUTES data dictionary view, described in Section 13.1.9.

3.5.2 Altering Source Database Attributes Using the Audit Vault Console

To alter the soruce database attributes using the Audit Vault Console:

1. Log in to the Audit Vault Console as a user who has been granted the AV_ADMIN role.

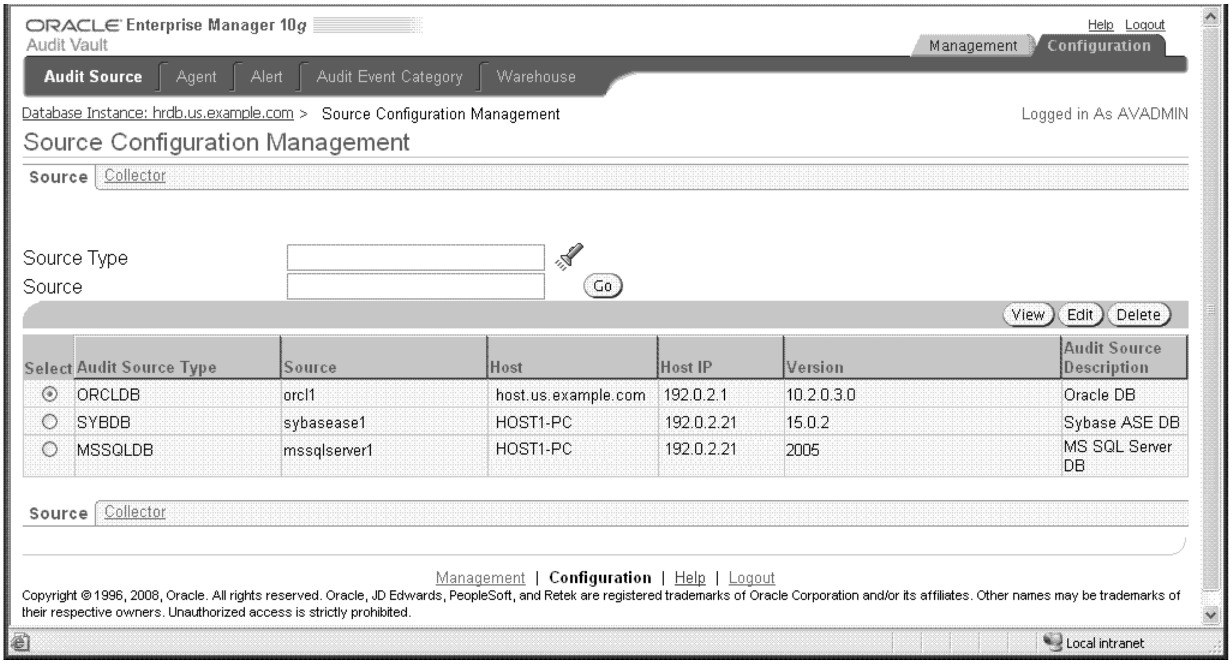
   See Section 3.2.3 for login instructions.

2. Select the **Configuration** tab, and then select the **Audit Source** subpage.

   The Source Configuration Management page appears.

3. Select the **Source** subpage.

   The Source Configuration Management page appears, which displays the current settings for the available collectors.



Database Instance: hrdb.us.example.com > Source Configuration Management

Logged in As AVADMIN

Source Configuration Management

Source Type

Source

Select	Audit Source Type	Source	Host	Host IP	Version	Audit Source Description
●	ORCLDB	orcl1	host.us.example.com	192.0.2.1	10.2.0.3.0	Oracle DB
○	SYBDB	sybasease1	HOST1-PC	192.0.2.21	15.0.2	Sybase ASE DB
○	MSSQLDB	mssqlserver1	HOST1-PC	192.0.2.21	2005	MS SQL Server DB

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4. Select the source database that you want to modify, and then click the **Edit** button.

   The Edit Source page appears.

5. Under Properties, optionally modify the description of the source database.
6. Under Attributes, modify the attributes for the source database by editing the values in the **Value** column.

   For more information about these attributes, see the following sections:

   - Section 8.5 for the Oracle Database source database attributes
   - Section 9.5 for the SQL Server source database attributes
   - Section 10.5 for the Sybase ASE source database attributes
   - Section 10.5 for the IBM DB2 source database attributes
7. Click **OK**.

3.5.3 Altering Source Database Attributes Using a Shell

To alter source database attributes using a shell:

1. In a shell for the Audit Vault Server, ensure that you have set its environment variables.

   See Section 2.2.2 for more information.
2. Run the `alter_source` command for the each source database type.

   To find the names and attributes of existing source databases, query the `ADM_SOURCE_ATTRIBUTES` data dictionary, described in Section 13.1.9.

   Examples are as follows:

   For Oracle Database:

   ```
   $ avorcldb alter_source -srcname hrdb.example.com PORT=1522
   ```

   See Section 8.5 for more information about the `avorldb alter_source` command.

   For Microsoft SQL Server:

   ```
   $ avmssqldb alter_source -srcname mssqldb4 DESCRIPTION="HR Database"
   ```

   See Section 9.5 for more information about the `avmssqldb alter_source` command.

   For Sybase ASE:

   ```
   $ avsybdb alter_source -srcname sybdb4 DESCRIPTION="HR Database"
   ```

   See Section 10.5 for more information about the `avsybdb alter_source` command.

   For IBM DB2:

   ```
   $ avdb2db alter_source -srcname db2db4 DESCRIPTION="HR Database"
   ```

   See Section 11.5 for more information about the `avdb2db alter_source` command.

3.6 Removing Source Databases from Oracle Audit Vault

This section contains:

- About Removing Source Databases from Oracle Audit Vault
- Removing a Source Database Using the Audit Vault Console
- Removing a Source Database Using a Shell

3.6.1 About Removing Source Databases from Oracle Audit Vault

If you no longer need to have a source database registered with Oracle Audit Vault, you can use either the Audit Vault Console or the command-line utilities to remove the source database from Audit Vault. After you have removed the source database, its audit data still resides in the data warehouse within its retention period. To purge this audit data, see Section 3.4.5. You can check the length of the retention period in the Audit Vault Console; see Section 3.4.2.

Remember that after you have removed a source database, its identity data remains in Audit Vault so that there will be a record of source databases that have been dropped. Therefore, you cannot add a new source database with the name of a dropped source database. Only remove the source database if you no longer want to collect its data or if it has moved to a new host computer.

3.6.2 Removing a Source Database Using the Audit Vault Console

To remove a source database from Oracle Audit Vault using the Audit Vault Console:

1. Log in to the Audit Vault Console as a user who has been granted the `AV_ADMIN` role.

   See Section 3.2.3 for login instructions.

2. Select the **Configuration** tab, and then select the **Audit Source** subpage.

   The Source subpage appears.

3. From the list of source databases, select the database that you want to remove, and then click **Delete**.

   You can search for a source database by entering data in the **Source Type** and **Source** fields. To find a listing of available source databases, you can query the `ADM_SOURCES` data dictionary view, described in Section 13.1.10.

4. Click **Yes** in the Confirmation window.

3.6.3 Removing a Source Database Using a Shell

To remove a source database from Oracle Audit Vault using a shell:

1. In a shell for the Audit Vault Server, ensure that you have set its environment variables.

   See Section 2.2.2 for more information.

2. Run the `drop_source` command for the source database.

   To find the names of existing source databases, query the `ADM_SOURCES` data dictionary view, described in Section 13.1.10.

Examples are as follows:

For Oracle Database:

```
$ avorcldb drop_source -srcname orcldb.example.com
```

See Section 8.7 for more information about the `avorldb drop_source` command.

For Microsoft SQL Server:

```
$ avmssqldb drop_source -srcname mssqldb4
```

See Section 9.7 for more information about the `avmssqldb drop_source` command.

For Sybase ASE:

```
$ avsybdb drop_source -srcname sybdb4
```

See Section 10.7 for more information about the `avsybdb drop_source` command.

For IBM DB2:

```
$ avdb2db drop_source -srcname db2db4
```

See Section 11.7 for more information about the `avdb2db drop_source` command.

4 Administrative Tasks

This chapter contains:

4.1 About the Administrative Tasks in This Chapter

This chapter describes important administrative tasks to perform on the Audit Vault system. These tasks are especially important if your audit data collectors are collecting high volumes of audit records and rapidly filling default tablespace and disk space settings.

4.2 Monitoring the Audit Vault Server SYSAUX Tablespace Space Usage

Following an Audit Vault Server installation and the creation of the Audit Vault database, the `SYSAUX` tablespace is created by default with one data file. The `SYSAUX` tablespace is a locally managed tablespace with automatic segment space management.

The Audit Vault administrator should monitor the space usage for the `SYSAUX` tablespace and set up additional data files for storage as needed. See *Oracle Database Administrator's Guide* for more information about the `ALTER TABLESPACE` SQL statement.

4.3 Monitoring Audit Vault Server Archive Log Disk Space Usage

During an Audit Vault Server installation, `ARCHIVELOG` mode is turned on by default. For this reason, the Audit Vault administrator must monitor the disk space usage for these files to prevent a small disk from quickly filling to capacity. See *Oracle Database Administrator's Guide* for more information about changing the `LOG_ARCHIVE_DEST_n` location to relocate these archive log files to larger disks. For information about backing up the archive logs, see *Oracle Database Backup and Recovery Advanced User's Guide*.

4.4 Monitoring the Audit Vault Server Flash Recovery Area

Following an Audit Vault Server installation, the `DB_RECOVERY_FILE_DEST_SIZE` initialization parameter is set to 2G and the `DB_RECOVERY_FILE_DEST` initialization parameter is set to the default flash recovery area, typically the *`ORACLE_HOME>/flash_recovery_area`* directory. The size of the flash recovery area should be large enough to hold a copy of all data files, all incremental backups, online redo logs, archived redo log not yet backed up on tape, control files, and control file auto backups. Depending upon how many collectors are configured, the scope of audit record collection being administered, and the backup and archive plans in operation, this space can fill to capacity rather quickly.

Use Oracle Enterprise Manager DB Console to monitor the available space in the flash recovery area. Monitor the percent space that is usable in the Usable Flash Recovery Area field under the High Availability section on the Home page. Check the alert log in the DB Console for messages. When the used space in the flash recovery area reaches 85%, a warning message is sent to the alert log. When the used space in the flash recovery area reaches 97 percent, a critical warning message is sent to the alert log.

You can manage space in the flash recovery area by adjusting the retention policy for data files to keep fewer copies or reduce the number of days these files stay in the recovery window. Another alternative is to increase the value of the `DB_RECOVERY_FILE_DEST_SIZE` initialization parameter to accommodate these files and to set the `DB_RECOVERY_FILE_DEST` initialization parameter to a value where more disk space is available. See *Oracle Database Administrator's Guide* and *Oracle Database Backup and Recovery Basics* for more information.

4.5 Changing Audit Vault User Passwords on a Regular Basis

Most businesses and groups adhere to some internal policy for changing user name passwords. This is usually part of a password management policy. This policy often requires users to make password changes on a regular basis, such as every 120 days. Changing Audit Vault user name passwords should be considered part of the same password management policy. This section provides additional information about Audit Vault user names and source user names and how and where password changes are implemented.

Table 4–1 shows where the passwords for the Oracle Audit Vault user names and source user names are stored and where password changes must be made. Note that if a password for a source user name is updated in the source database, then the password, because it is also stored in the wallet in the Oracle Audit Vault collection agent home, must also be updated.

Table 4–1 Storage Location of Audit Vault and Source User Name Passwords

Audit Vault Role	Audit Vault User Name	Is Password Stored in Wallet?	How Is Password Change Made?
`AV_ADMIN`	*`avadminusr`*	Yes	Use the `AVCA create_credential` command to change the password in the wallet in the Audit Vault Server home. You must also change the password of this user in the database.

Table 4–1 (Cont.) Storage Location of Audit Vault and Source User Name Passwords

Audit Vault Role	Audit Vault User Name	Is Password Stored in Wallet?	How Is Password Change Made?
`AV_AGENT`	*`avagentusr`*	Yes	Use the `AVCA create_credential` command to change the password in the wallet in the Audit Vault Collection Agent home. You must also change the password of this user in the database.
Source user on source database	*`srcusr`*	Yes	Use the SQL `ALTER USER` command on the source database Audit Vault Server home. Use the `setup` command of the `avorcldb`, `avmssqldb`, or the `avsybdb` utility to change the password in the wallet in the Audit Vault Collection Agent home
`AV_AUDITOR`	*`avauditorusr`*	No	Use the SQL `ALTER USER` command in the Audit Vault Server home

Change the Passwords of the avauditorusr User Name in the Audit Vault Server Home

To change the passwords of the `avauditorusr` user name, make the change in the Audit Vault Server home in the Audit Vault database using the SQL `ALTER_USER` command. Log in as the user with the role of Database Vault Account Manager.

For example, to change passwords of the `avauditorusr` user name, perform the following steps:

1. Log in to SQL*Plus as the Database Vault Account Manager.

   For the Basic installation, log in as follows:

   ```
   sqlplus avadmindva
   Enter password: avadmin-user-password
   Connected.
   SQL>
   ```

   For the Advanced installation, log in as follows:

   ```
   sqlplus dv_acctmgr-user-name
   Enter password: dv_acctmgr-user-password
   Connected.
   SQL>
   ```

2. To change the *`avauditorusr name`* password, use the SQL `ALTER USER` command.

   ```
   SQL> alter user avauditorusr-name identified by avauditorusr-password;
   ```

Change the Password of the avadminusr User Name in the Audit Vault Server Home

After you have updated the *`avadminuser`* account, you must update the password credentials of this user. To do so, use the `avca create_credential` command.

For example, to change password of the *`avadminusr`* user name, perform the following step in the Audit Vault Server home. To update the password for the credential, use the following `avca create_credential` command. Enter the *`avadminusr`* user name and new password and confirm the password. The database alias is the Audit Vault Server SID or Oracle instance identifier in the Audit Vault Server home. For example:

```
avca create_credential -wrl $ORACLE_HOME/network/admin/avwallet -dbalias SID
AVCA started
Storing user credentials in wallet...
Enter source user username: avadminuser
Enter source user password: password
Re-enter source user password: password
Create credential Modify credential
Modify 2
done.
```

Change the Passwords of the avagentusr and srcusr User Name in the Audit Vault Collection Agent Home

After you have updated the *avadminuser* account, you must update the password credentials of this user. To do so, use the `AVCA create_credential` command. To change the password of the *srcusr* user name in the wallet location, use the `avorcldb setup` command.

For example, to change the passwords of the *avagentusr* and *srcusr* user names, perform the following steps in the Audit Vault Collection Agent home: To update the *avagentusr* user name password, use the following `AVCA create_credential` command shown in Step 1. The database alias is always `av` in the Audit Vault Collection Agent home. To update the *srcusr* user name password, use the following `avorcldb setup` command shown in Step 2.

1. Enter the *avagentusr* user name and new password and confirm the password. For example:

   ```
   avca create_credential -wrl $ORACLE_HOME/network/admin/avwallet -dbalias av
   AVCA started
   Storing user credentials in wallet...
   Enter source user username: avagentuser
   Enter source user password: password
   Re-enter source user password: password
   Create credential Modify credential
   Modify 2
   done.
   ```

2. Enter the *srcusr* user name and new password, where the source name is `orcl1` and the source user name is `srcuser1`. For example:

   ```
   avorcldb setup -srcname orcl1
   Enter Source user name: srcuser1
   Enter Source password: *******
   adding credentials for user srcuser1 for connection [SRCDB1]
   Storing user credentials in wallet...
   Create credential oracle.security.client.connect_string3
   done.
   updated tnsnames.ora with alias [SRCDB1] to source database
   verifying SRCDB1 connection using wallet
   ```

Check To Ensure All Changed User Name Passwords Work Correctly

Always check to make sure all changed passwords for Audit Vault user names and source user names are working correctly. To check the passwords of the *avadminusr* and *avauditorusr* user name, open a Web browser and log in to the Audit Vault Console as the Audit Vault administrator. Then log out and log in to the Audit Vault

Console as the Audit Vault auditor. A successful log in indicates that the new *avadminusr* and *avauditor* user name passwords are working fine. If your login is not successful after several attempts, repeat the steps previously mentioned in this section to change the password again for that particular Audit Vault user name and retry the login.

Next, stop the collection agent and collectors and start the collection agent and each collector. If the collection agent and the collectors each start up and collectors are collecting audit records again, the new *avagntusr* and *srcusr* user name passwords are all working.

If you experience problems, check the log files (see Chapter A for more information) to determine which user name password might be the source of the problem. Then, if needed, repeat the steps previously mentioned to change the password for that user name and try to start up the collection agent and the collectors again.

4.6 Managing Oracle Audit Vault Back-Up and Recovery Operations

When you back-up Oracle Audit Vault, you must back up the database, the Audit Vault Server home, and the Audit Vault collection agent home.

> **See Also:** *Oracle Database Backup and Recovery Basics* for more information about backing up a database.

Backing Up the Database

After cleanly shutting down the instance following the analysis of the database, you should perform a full backup of the database. Complete the following steps:

1. Log in to RMAN:

   ```
   rman "target / nocatalog"
   ```

2. Issue the following RMAN commands:

   ```
   BACKUP DATABASE FORMAT 'some_backup_directory%U' TAG before_upgrade;
   BACKUP CURRENT CONTROLFILE TO 'save_controlfile_location';
   ```

Backing Up Audit Vault Server Home and Audit Vault Collection Agent Home

Back up or copy the Audit Vault Server home and the Audit Vault collection agent home each to a different directory.

4.7 Using a Collection Agent to Listen to Oracle Database RAC Nodes

In an Oracle Real Application Clusters (Oracle RAC) environment, after the Audit Vault Collection Agent is set up, the node on which the collection agent was installed has its listener set up to listen to only that node. Thus, only that node can be specified to which to connect. However, the administrator can set up the listener to listen to the other nodes.

For the OSAUD and DBAUD collectors, the Administrator must update the `tnsnames.ora` file during installation of the Audit Vault Collection Agents.

After the collection agent is set up, the `tnsnames.ora` file located in `$ORACLE_HOME/network/admin` might have the following alias:

```
AV = (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = node01)
(PORT = 1521))(CONNECT_DATA = (SERVICE_NAME = av.us.oracle.com)))
```

For high availability, the administrator might need to edit the Audit Vault Collection Agent home tnsnames.ora file after the collection agent is set up and add the host and port of the other listeners. For example:

```
AV =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = node01)(PORT = 1521))
    (ADDRESS = (PROTOCOL = TCP)(HOST = node02)(PORT = 1521))
    (ADDRESS = (PROTOCOL = TCP)(HOST = node03)(PORT = 1521))
    (ADDRESS = (PROTOCOL = TCP)(HOST = node04)(PORT = 1521))
    (LOAD_BALANCE = yes)
    (CONNECT_DATA =
      (SERVER = DEDICATED)
        (SERVICE_NAME = av.us.oracle.com)
    )
  )
```

For the REDO collector, the administrator must log in as the *srcuser* at the source database and re-create the database link for av.us.oracle.com. The new database link can either have a list of host and port numbers or point to a tnsnames entry with the list of host and port numbers.

4.8 Configuring Collection Agent Connectivity for Oracle Database RAC

When a source Oracle database is added to Oracle Audit Vault, you must provide the *host*:*port*:*service* information for the source database being added. This information is used for the following tasks from the collection agent:

- REDO collector: starting and stopping the capture process on the source
- DBAUD collector: retrieving rows from AUD$ and FGA_LOG$ tables
- Policy management: retrieving source dictionary information

Typically, when the Oracle Database instance on the host goes down or if the host machine goes down, the connectivity to the source from the Audit Vault Collection Agent is broken and any attempt to perform these tasks is unsuccessful because this connection is not available:

The Audit Vault administrator can do any or all of the following operations to make the connection between the source and the Audit Vault Collection Agent more highly available:

- Update in the Audit Vault Collection Agent home, the tnsnames.ora file in the /network/admin directory on Linux or UNIX systems or in the \network\admin directory on Windows systems to add additional host or port information for the service. The user can also add options for load balancing and failure in the connect string. For additional information, see *Oracle Database Net Services Administrator's Guide* and specifically Chapter 13 "Enabling Advanced Features of Oracle Net Services".
- Configure a listener on the Oracle RAC nodes to support connecting to remote nodes and configuring the Oracle Database to communicate with remote listeners. This will help in the situation when the Oracle Database instance goes down, then the listener on the host can create connections on a different Oracle RAC node. For additional information, see *Oracle Database Net Services Administrator's Guide* and specifically Chapter 10 "Configuring and Administering the Listener".

- Provide host information using the virtual IP address of the node instead of the physical IP address. This will help when the host machine goes down, then all traffic to the host will get redirected to a different node.

4.9 Purging Oracle Database Audit Trail Records

This section contains:

- General Steps for Purging the Oracle Database Audit Trail
- Step 1: Prepare the Oracle Database Audit Trail for Purging
- Step 2: Create a Job to Automatically Purge the Oracle Database Audit Trail
- Step 3: Optionally, Set a Records Batch Size for the Purge Operations
- Step 4: Perform Maintenance Tasks as Needed

4.9.1 General Steps for Purging the Oracle Database Audit Trail

Follow these general steps to purge the Oracle Database audit trail records:

1. Be aware that the purge process can generate additional redo logs.

   Before you purge the Oracle Database audit trail, you may need to tune online and archive redo log sizes to accommodate the additional records generated during the audit table purge process. For more information about tuning log files, see *Oracle Database Performance Tuning Guide* and *Oracle Database Administrator's Guide*.

2. Complete the preparatory steps described in Section 4.9.2.

   You must download and install the `DBMS_AUDIT_MGMT` PL/SQL package, which is available as a patch set from the Oracle*MetaLink* Web site. After you install this package, you must move the database audit trail to a different tablespace before you can purge the audit trail.

3. Configure an automatic purge job by following the steps in Section 4.9.3.
4. After you configure the purge time for the automatic purge job and before the purge takes place, optionally configure the audit records to be deleted in batches. For very large audit trails, deleting the records in batches helps to speed the purge process. See Section 4.9.4.
5. Perform maintenance tasks as needed, as described in Section 4.9.5.

> **Note:** Oracle Database audits all deletions from the audit trail, without exception.

4.9.2 Step 1: Prepare the Oracle Database Audit Trail for Purging

This section contains:

- Step 1A: Download the DBMS_AUDIT_MGMT Package
- Step 1B: Move the Database Audit Trail to a Different Tablespace

4.9.2.1 Step 1A: Download the DBMS_AUDIT_MGMT Package

The `DBMS_AUDIT_MGMT` PL/SQL package enables you to perform the following tasks with the Oracle Database audit trail:

- Move the database audit trail from the SYSTEM table space to a different tablespace, such as the SYSAUX tablespace
- Set the size and age of the operating system audit trail file before creating a new operating system audit trail file
- Purge the audit trail records, either by manually purging the records or by creating a purge job

The DBMS_AUDIT_MGMT PL/SQL package is available in a patch set. Check Oracle*MetaLink* and the *Oracle Audit Vault Release Notes* for information about the specific Oracle Database versions you can use with this package.

The Oracle*MetaLink* Web site is available at the following Web site:

https://metalink.oracle.com

If you do not have a current Oracle Support Services contract, then you can access the same information at the following Web site:

http://www.oracle.com/technology/support/metalink/content.html

For reference information about the DBMS_AUDIT_MGMT PL/SQL package, see Section 2.9. Section 13.2 describes the data dictionary views that accompany the DBMS_AUDIT_MGMT package.

4.9.2.2 Step 1B: Move the Database Audit Trail to a Different Tablespace

The SYSTEM tablespace stores the database audit trail AUD$ and FGA_LOG$ tables. When you initialize the purge process, by default Oracle Database moves the AUD$ and FGA_LOG$ tables to the SYSAUX tablespace. If you prefer to store these tables in a different tablespace, follow the procedures in this section.

Be aware that moving the database audit trail tables to a different tablespace can take a while, so you may want to do this during a time when database activity is slow.

To move the database audit trail from SYSTEM to a different tablespace:

1. Log in to SQL*Plus as an administrator who has the EXECUTE privilege on the DBMS_AUDIT_MGMT PL/SQL package.

   For more information about the DBMS_AUDIT_MGMT PL/SQL package, see Chapter 14.

2. Check the tablespace to which you want to move the database audit trail tables.

   You may need to optimize and allocate more space to this tablespace, including the SYSAUX auxiliary tablespace. For more information, see *Oracle Database Performance Tuning Guide*.

3. Run the DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_LOCATION PL/SQL procedure to specify the name of the destination tablespace and move it to that tablespace.

   For example:

   ```
   BEGIN
    DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_LOCATION(
     AUDIT_TRAIL_TYPE            => DBMS_AUDIT_MGMT.AUDIT_TRAIL_AUD_STD,
     AUDIT_TRAIL_LOCATION_VALUE  => 'AUD_AUX');
   END;
   ```

   In this example:

   - AUDIT_TRAIL_TYPE: Refers to the database audit trail type. Enter one of the following values:

- DBMS_AUDIT_MGMT.AUDIT_TRAIL_AUD_STD: Standard audit trail table, AUD$.
- DBMS_AUDIT_MGMT.AUDIT_TRAIL_FGA_STD: Fine-grained audit trail table, FGA_LOG$.
- DBMS_AUDIT_MGMT.AUDIT_TRAIL_DB_STD: Both standard and fine-grained audit trail tables.

- AUDIT_TRAIL_LOCATION_VALUE: Specifies the destination tablespace. This example specifies a tablespace named AUD_AUX.

4.9.3 Step 2: Create a Job to Automatically Purge the Oracle Database Audit Trail

The automatic purge job deletes all audit records that were created before the last recorded timestamp. Be aware that purging the audit trail, particularly a large one, can take awhile to complete. Consider scheduling the purge job so that it runs during a time when the database is not busy.

To set up an automatic purge job:

- Step 2A: Ensure That the Collectors Are Enabled
- Step 2B: Initialize the Audit Trail Clean-Up Operation
- Step 2C: Create the Purge Job

4.9.3.1 Step 2A: Ensure That the Collectors Are Enabled

Ensure that the Oracle Audit Vault collectors are recording timestamps and archiving the audit trail records. See Section 2.9 to check the status of the collectors. To find the last recorded timestamp, query the DBA_AUDIT_MGMT_LAST_ARCH_TS data dictionary view, described in Section 13.2.2. If the collectors had been disabled, then this view shows the last recorded timestamp that occurred before the collector had been disabled.

4.9.3.2 Step 2B: Initialize the Audit Trail Clean-Up Operation

Before you can purge the audit trail, you must initialize the audit trail clean-up operation. For the database audit trail, if you have not moved the database audit trail tables (SYS.AUD$ and SYS.FGA_LOG$) from the SYSTEM tablespace to another tablespace, this process moves these tables to the SYSAUX tablespace, or the tablespace that you specified in Section 4.9.2.2. Be aware that moving these tables takes a while, so you may want to schedule the initialization process during time when the database is not busy.

To initialize the audit trail clean-up operation:

1. Log in to SQL*Plus as an administrative user who has the EXECUTE privilege on the DBMS_AUDIT_MGMT PL/SQL package.
2. Initialize the audit trail clean-up operation by running the DBMS_AUDIT_MGMT.INIT_CLEANUP procedure.

   For example:

   ```
   BEGIN
    DBMS_AUDIT_MGMT.INIT_CLEANUP(
     AUDIT_TRAIL_TYPE            => DBMS_AUDIT_MGMT.AUDIT_TRAIL_DB_AUD,
     DEFAULT_CLEANUP_INTERVAL    => 12 );
   END
   ```

   In this example:

- AUDIT_TRAIL_TYPE: Enter one of the following values:
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_DB_AUD: Standard audit trail table, AUD$.
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_FGA_STD: Fine-grained audit trail table, FGA_LOG$.
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_DB_STD: Both standard and fine-grained audit trail tables.
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS: Operating system audit trail files with the .aud extension. (This setting does not apply to Windows Event Log entries.)
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_XML: XML Operating system audit trail files.
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_FILES: Both operating system and XML audit trail files.
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_ALL: All audit trail records, that is, both database audit trail and operating system audit trail types.
- DEFAULT_CLEANUP_INTERVAL: Specify the desired default hourly purge interval, for example, 12. The DBMS_AUDIT_MGMT procedures use this value to determine how to purge audit records. The timing begins when you run the DBMS_AUDIT_MGMT.INIT_CLEANUP procedure. Later on, if you want to update this value, set the DBMS_AUDIT_MGMT.CLEAN_UP_INTERVAL property of the DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_PROPERTY procedure.

4.9.3.3 Step 2C: Create the Purge Job

Create the purge job by running the DBMS_AUDIT_MGMT.CREATE_PURGE_JOB PL/SQL procedure.

For example:

```
BEGIN
  DBMS_AUDIT_MGMT.CREATE_PURGE_JOB (
   AUDIT_TRAIL_TYPE            => DBMS_AUDIT_MGMT.AUDIT_TRAIL_DB_AUD,
   AUDIT_TRAIL_PURGE_INTERVAL  => 12,
   AUDIT_TRAIL_PURGE_NAME      => 'Standard_Audit_Trail_PJ',
   USE_LAST_ARCH_TIMESTAMP     => TRUE );
END;
```

In this example:

- AUDIT_TRAIL_TYPE: Enter one of the following values:
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_DB_AUD: Standard audit trail table, AUD$
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_FGA_STD: Fine-grained audit trail table, FGA_LOG$
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_DB_STD: Both standard and fine-grained audit trail tables
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS: Operating system audit trail files with the .aud extension. (This setting does not apply to Windows Event Log entries.)

  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_XML: XML audit trail files
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_FILES: Both operating system and XML audit trail files
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_ALL: All audit trail records, that is, both database audit trail and operating system audit trail types

- AUDIT_TRAIL_PURGE_INTERVAL: Specify the hourly interval for this purge job to run. The timing begins when you run the DBMS_AUDIT_MGMT.CREATE_PURGE_JOB procedure, in this case, 12 hours after you run this procedure. Later on, if you want to update this value, run the DBMS_AUDIT_MGMT.SET_PURGE_JOB_INTERVAL procedure.
- USE_LAST_ARCH_TIMESTAMP: Enter either of the following settings:
  - TRUE: Deletes audit records created before the last archive timestamp. To check the last recorded timestamp, query the DBA_AUDIT_MGMT_LAST_ARCH_TS data dictionary view. The default value is TRUE.
  - FALSE: Deletes all audit records without considering last archive timestamp.

4.9.4 Step 3: Optionally, Set a Records Batch Size for the Purge Operations

When Oracle Database purges records from the database audit trail, it deletes them in batched groups at a time during the clean-up process. Before the purge takes place, you can set the number of records that best suits your environment. If the database audit trail is very large (and audit trails can grow quite large), deleting the records in groups facilitates the purge operation. To find the current batch size setting, query the DBA_AUDIT_MGMT_CONFIG_PARAMS data dictionary view, which is described in Section 4.9.4.

For example:

```
BEGIN
 DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_PROPERTY(
  AUDIT_TRAIL_TYPE            => DBMS_AUDIT_MGMT.AUDIT_TRAIL_AUD_STD,
  AUDIT_TRAIL_PROPERTY        => DBMS_AUDIT_MGMT.DB_DELETE_BATCH_SIZE,
  AUDIT_TRAIL_PROPERTY_VALUE  => 100000);
END
```

In this example:

- AUDIT_TRAIL_TYPE: Specifies the audit trail type, which in this case is the database system audit trail. Enter one of the following values:
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_DB_AUD: Standard audit trail table, AUD$.
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_FGA_STD: Fine-grained audit trail table, FGA_LOG$.
- AUDIT_TRAIL_PROPERTY: Uses the DBMS_AUDIT_MGMT.DB_DELETE_BATCH_SIZE property to indicate the batch size setting. To find the status of the current property settings, query the DBA_AUDIT_MGMT_CONFIG_PARAMS data dictionary view.
- AUDIT_TRAIL_PROPERTY_VALUE: Sets the number of audit records to be 1,000,000 for each batch. Enter a value between 100 and 1000000. To determine this number, consider the total number of records being purged, and the time interval in which the purge operation is performed. The default is 10000.

4.9.5 Step 4: Perform Maintenance Tasks as Needed

This section contains:

- Verifying That the Audit Trail Is Initialized for Clean-Up
- Enabling or Disabling an Audit Trail Purge Job
- Setting the Default Audit Trail Purge Interval for Any Audit Trail Type
- Setting the Default Audit Trail Purge Job Interval for a Specified Purge Job
- Clearing the Database Audit Trail Records Batch Size
- Cancelling the Initialization Clean-Up Settings
- Deleting an Audit Trail Purge Job
- Configuring Tracing Debug Levels for Purge Operations
- Setting the Size of the Operating System Audit Trail
- Setting the Age of the Operating System Audit Trail

4.9.5.1 Verifying That the Audit Trail Is Initialized for Clean-Up

You can check if the audit trail has been initialized for clean-up by running the DBMS_AUDIT_MGMT.IS_CLEANUP_INITIALIZED function. If the audit trail has been initialized, then this function returns TRUE. If it is not, it returns FALSE.

For example:

```
SET SERVEROUTPUT ON
BEGIN
 IF
   DBMS_AUDIT_MGMT.IS_CLEANUP_INITIALIZED(DBMS_AUDIT_MGMT.AUDIT_TRAIL_AUD_STD)
 THEN
   DBMS_OUTPUT.PUT_LINE('AUD$ is initialized for clean-up');
 ELSE
   DBMS_OUTPUT.PUT_LINE('AUD$ is not initialized for clean-up.');
 END IF;
END;
```

In this example:

- AUDIT_TRAIL_TYPE: Specifies the audit trail type, which in this case is the database system audit trail. Choose from the AUDIT_TRAIL_TYPE settings described in Step 2B: Initialize the Audit Trail Clean-Up Operation.

4.9.5.2 Enabling or Disabling an Audit Trail Purge Job

To enable or disable an audit trail purge job, use the DBMS_AUDIT_MGMT.SET_PURGE_JOB_STATUS PL/SQL procedure.

For example:

```
BEGIN
 DBMS_AUDIT_MGMT.SET_PURGE_JOB_STATUS(
  AUDIT_TRAIL_PURGE_NAME      => 'OS_Audit_Trail_PJ',
  AUDIT_TRAIL_STATUS_VALUE    => DBMS_AUDIT_MGMT.PURGE_JOB_ENABLE);
END
```

In this example:

- AUDIT_TRAIL_PURGE_NAME: Specifies a purge job called OS_Audit_Trail_PJ. To find existing purge jobs, query the DBA_AUDIT_MGMT_CLEANUP_JOBS data dictionary view.
- AUDIT_TRAIL_STATUS_VALUE: Enter one of the following properties:
  - DBMS_AUDIT_MGMT.PURGE_JOB_ENABLE: Enables the specified purge job.
  - DBMS_AUDIT_MGMT.PURGE_JOB_DISABLE: Disables the specified purge job.

4.9.5.3 Setting the Default Audit Trail Purge Interval for Any Audit Trail Type

You can set a default purge operation interval, in hours, that must pass before the next purge operation takes place for a specified audit trail type.

For example:

```
BEGIN
 DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_PROPERTY(
  AUDIT_TRAIL_TYPE            => DBMS_AUDIT_MGMT.AUDIT_TRAIL_AUD_STD,
  AUDIT_TRAIL_PROPERTY        => DBMS_AUDIT_MGMT.CLEAN_UP_INTERVAL,
  AUDIT_TRAIL_PROPERTY_VALUE  => 24);
END
```

In this example:

- AUDIT_TRAIL_TYPE: Specifies the audit trail type, which in this case is the database system audit trail. Choose from the following settings:
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_DB_AUD: Standard audit trail table, AUD$
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_FGA_STD: Fine-grained audit trail table, FGA_LOG$
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_DB_STD: Both standard and fine-grained audit trail tables
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS: Operating system audit trail files with the .aud extension. (This setting does not apply to Windows Event Log entries.)
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_XML: XML Operating system audit trail files
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_FILES: Both operating system and XML audit trail files
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_ALL: All audit trail records, that is, both database audit trail and operating system audit trail types

  You can set a default interval for multiple audit trail types, so long as they do not conflict. For example, you can set individual intervals for the DBMS_AUDIT_MGMT.AUDIT_TRAIL_DB_AUD and DBMS_AUDIT_MGMT.AUDIT_TRAIL_FGA_STD properties, but not for the DBMS_AUDIT_MGMT.AUDIT_TRAIL_DB_STD property.
- AUDIT_TRAIL_PROPERTY: Sets the DBMS_AUDIT_MGMT.CLEAN_UP_INTERVAL property to indicate the purge operation interval setting. To find the current property settings, query the DBA_AUDIT_MGMT_CONFIG_PARAMS data dictionary view. The timing begins when you set the DBMS_AUDIT_MGMT.CLEAN_UP_INTERVAL property.

- AUDIT_TRAIL_PROPERTY_VALUE: Updates the default hourly interval set by the DBMS_AUDIT_MGMT.INIT_CLEANUP procedure. Enter a value between 1 and 999.

4.9.5.4 Setting the Default Audit Trail Purge Job Interval for a Specified Purge Job

You can set a default purge operation interval, in hours, that must pass before the next purge job operation takes place. The interval setting that is used in the DBMS_AUDIT_MGMT.CREATE_PURGE_JOB procedure takes precedence over this setting.

For example:

```
BEGIN
 DBMS_AUDIT_MGMT.SET_PURGE_JOB_INTERVAL(
  AUDIT_TRAIL_PURGE_NAME       => 'OS_Audit_Trail_PJ',
  AUDIT_TRAIL_INTERVAL_VALUE   => 24 );
END
```

In this example:

- AUDIT_TRAIL_PURGE_NAME: Specifies the name of the audit trail purge job. To find a list of existing purge jobs, query the DBA_AUDIT_MGMT_CLEANUP_JOBS data dictionary view.
- AUDIT_TRAIL_INTERVAL_VALUE: Updates the default hourly interval set by the DBMS_AUDIT_MGMT.CREATE_PURGE_JOB procedure. Enter a value between 1 and 999. The timing begins when you run the purge job.

4.9.5.5 Clearing the Database Audit Trail Records Batch Size

To clear this setting, use the DBMS_AUDIT_MGMT.CLEAR_AUDIT_TRAIL_PROPERTY procedure.

For example:

```
BEGIN
  DBMS_AUDIT_MGMT.CLEAR_AUDIT_TRAIL_PROPERTY(
   AUDIT_TRAIL_TYPE         =>  DBMS_AUDIT_MGMT.AUDIT_TRAIL_AUD_STD,
   AUDIT_TRAIL_PROPERTY     =>  DBMS_AUDIT_MGMT.DB_DELETE_BATCH_SIZE,
   USE_DEFAULT_VALUES       =>  TRUE );
END;
```

In this example:

- AUDIT_TRAIL_TYPE: Specifies the audit trail type, which in this case is the database system audit trail. Enter one of the AUDIT_TRAIL_TYPE values listed in Section 4.9.4.
- AUDIT_TRAIL_PROPERTY: Specifies the DB_DELETE_BATCH_SIZE property. Query the DBA_AUDIT_MGMT_CONFIG_PARAMS data dictionary view to find the current status of this property.
- USE_DEFAULT_VALUES: Enter one of the following values:
  - TRUE: Clears the current audit record batch size and uses the default value, 10000, instead.
  - FALSE: Oracle Database does not set any batch size for audit records. The default setting is FALSE.

4.9.5.6 Cancelling the Initialization Clean-Up Settings

You can cancel the DBMS_AUDIT_MGMT.INIT_CLEANUP settings, that is, the default clean-up interval, by invoking the DBMS_AUDIT_MGMT.DEINIT_CLEANUP procedure.

For example, to cancel all purge settings for the standard audit trail:

```
BEGIN
 DBMS_AUDIT_MGMT.DEINIT_CLEANUP(
  AUDIT_TRAIL_TYPE  => DBMS_AUDIT_MGMT.AUDIT_TRAIL_AUD_STD);
END;
```

In this example:

- AUDIT_TRAIL_TYPE: Enter one of the AUDIT_TRAIL_TYPE settings listed in Step 2B: Initialize the Audit Trail Clean-Up Operation.

4.9.5.7 Deleting an Audit Trail Purge Job

To delete an audit trail purge job, use the DBMS_AUDIT_MGMT.DROP_PURGE_JOB PL/SQL procedure. To find existing purge jobs, you can query the DBA_AUDIT_MGMT_CLEANUP_JOBS data dictionary view.

For example:

```
BEGIN
 DBMS_AUDIT_MGMT.DROP_PURGE_JOB(
  AUDIT_TRAIL_PURGE_NAME  => 'FGA_Audit_Trail_PJ');
END
```

In this example:

- AUDIT_TRAIL_PURGE_NAME: Specifies a purge job called FGA_Audit_Trail_PJ.

4.9.5.8 Configuring Tracing Debug Levels for Purge Operations

To diagnose errors, you can set the trace level for purge operations. Oracle Database creates trace files in the location set by the USER_DUMP_DEST initialization parameter. To find this location, log in to SQL*Plus and enter SHOW PARAMETER USER_DUMP_DEST.

As an example of the type of error the trace debug levels can catch, suppose you try to move the database audit trail table from SYSTEM to a different tablespace. Before moving the tables to the new tablespace, Oracle Database checks the space of the destination tablespace to ensure that it can hold the database audit trail tables. The debug log level can reveal if there is not enough space.

Use the DBMS_AUDIT_MGMT.SET_DEBUG_LEVEL PL/SQL procedure to set the trace level.

For example:

```
BEGIN
DBMS_AUDIT_MGMT.SET_DEBUG_LEVEL(
 DEBUG_LEVEL   => TRACE_LEVEL_DEBUG);
END
```

In this example:

- DEBUG_LEVEL: Specify one of the following values:
  - TRACE_LEVEL_DEBUG
  - TRACE_LEVEL_ERROR (default setting)

4.9.5.9 Setting the Size of the Operating System Audit Trail

To control the size of the operating system audit trail, set the DBMS_AUDIT_MGMT.OS_FILE_MAX_SIZE property by using the DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_PROPERTY PL/SQL procedure. Remember that you must have the EXECUTE privilege for the DBMS_AUDIT_MGMT PL/SQL package before you can use it. When the operating system file meets the size limitation you set, Oracle Database stops adding records to the current file and then creates a new operating system file for the subsequent records.

If you set both the DBMS_AUDIT_MGMT.OS_FILE_MAX_SIZE and the DBMS_AUDIT_MGMT.OS_FILE_MAX_AGE (described in Section 4.9.5.9) properties, then Oracle Database performs the action based the property value limit that is met first.

For example:

```
BEGIN
  DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_PROPERTY(
   AUDIT_TRAIL_TYPE            =>  DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS,
   AUDIT_TRAIL_PROPERTY        =>  DBMS_AUDIT_MGMT.OS_FILE_MAX_SIZE,
   AUDIT_TRAIL_PROPERTY_VALUE  =>  102400);
END;
```

In this example:

- AUDIT_TRAIL_TYPE: Specifies the operating system audit trail. Enter one of the following values:
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS: Operating system audit trail files with the .aud extension. (This setting does not apply to Windows Event Log entries.)
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_XML: XML audit trail files.
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_FILES: Both operating system and XML audit trail files.
- AUDIT_TRAIL_PROPERTY: Specifies the DBMS_AUDIT_MGMT.OS_FILE_MAX_SIZE property to set the maximum size. To find the status of the current property settings, query the DBA_AUDIT_MGMT_CONFIG_PARAMS data dictionary view.
- AUDIT_TRAIL_PROPERTY_VALUE: Sets the maximum size to 102400 kilobytes. The default setting is 10,000 kilobytes (approximately 10 MB). Do not exceed 2 gigabytes.

Clearing the DBMS_AUDIT_MGMT.OS_FILE_MAX_SIZE Setting

To clear the maximum file size setting, use the DBMS_AUDIT_MGMT.CLEAR_AUDIT_TRAIL_PROPERTY procedure.

For example:

```
BEGIN
  DBMS_AUDIT_MGMT.CLEAR_AUDIT_TRAIL_PROPERTY(
   AUDIT_TRAIL_TYPE        =>  DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS,
   AUDIT_TRAIL_PROPERTY    =>  DBMS_AUDIT_MGMT.OS_FILE_MAX_SIZE,
   USE_DEFAULT_VALUES      =>  TRUE );
END;
```

In this example:

- AUDIT_TRAIL_TYPE: Specifies the operating system audit trail. Enter one of the AUDIT_TRAIL_TYPE values described in Section 4.9.5.9.

- AUDIT_TRAIL_PROPERTY: Specifies the DBMS_AUDIT_MGMT.OS_FILE_MAX_SIZE property. You can query the DBA_AUDIT_MGMT_CONFIG_PARAMS data dictionary view to find the current status of this property.
- USE_DEFAULT_VALUES: Enter one of the following values:
  - TRUE: Clears the current value and uses the default value, 10,000 kilobytes, instead.
  - FALSE: Oracle Database does not use a default maximum size for the operating system or XML file growth. The files will continue to grow without limitation unless you configure the DBMS_AUDIT_MGMT.OS_FILE_MAX_AGE property. The default setting is FALSE.

4.9.5.10 Setting the Age of the Operating System Audit Trail

To control the age of the operating system audit trail, use the DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_PROPERTY PL/SQL procedure. Remember that you must have the EXECUTE privilege for the DBMS_AUDIT_MGMT PL/SQL package before you can use it. When the operating system file meets the age limitation you set, Oracle Database stops adding records to the current file and then creates a new operating system file for the subsequent records. For more information about the DBMS_AUDIT_MGMT PL/SQL package, see *Oracle Database PL/SQL Packages and Types Reference*.

If you set both the DBMS_AUDIT_MGMT.OS_FILE_MAX_AGE and the DBMS_AUDIT_MGMT.OS_FILE_MAX_SIZE (described in Section 4.9.5.9) properties, then Oracle Database performs the action based on the property value limit that is met first.

For example:

```
BEGIN
  DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_PROPERTY(
   AUDIT_TRAIL_TYPE            =>  DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS,
   AUDIT_TRAIL_PROPERTY        =>  DBMS_AUDIT_MGMT.OS_FILE_MAX_AGE,
   AUDIT_TRAIL_PROPERTY_VALUE  =>  10 );
END;
```

In this example:

- AUDIT_TRAIL_TYPE: Specifies the operating system audit trail. Enter one of the following values:
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS: Operating system audit trail files with the .aud extension. (This setting does not apply to Windows Event Log entries.)
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_XML: XML audit trail files.
  - DBMS_AUDIT_MGMT.AUDIT_TRAIL_FILES: Both operating system and XML audit trail files.
- AUDIT_TRAIL_PROPERTY: Specifies the DBMS_AUDIT_MGMT.OS_FILE_MAX_AGE property to set the maximum age. To find the status of the current property setting, query the DBA_AUDIT_MGMT_CONFIG_PARAMS data dictionary view.
- AUDIT_TRAIL_PROPERTY_VALUE: Sets the maximum age to 10 days. Enter a value between 1 and 495. The default age is 5 days.

Clearing the DBMS_AUDIT_MGMT.OS_FILE_MAX_AGE Setting

To clear the maximum file age setting, use the DBMS_AUDIT_MGMT.CLEAR_AUDIT_TRAIL_PROPERTY procedure.

For example:

```
BEGIN
  DBMS_AUDIT_MGMT.CLEAR_AUDIT_TRAIL_PROPERTY(
   AUDIT_TRAIL_TYPE        =>  DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS,
   AUDIT_TRAIL_PROPERTY    =>  DBMS_AUDIT_MGMT.OS_FILE_MAX_AGE,
   USE_DEFAULT_VALUES      =>  TRUE );
END;
```

In this example:

- AUDIT_TRAIL_TYPE: Specifies operating system audit trail. Enter one of the AUDIT_TRAIL_TYPE values listed in Section 4.9.5.9.
- AUDIT_TRAIL_PROPERTY: Specifies the DBMS_AUDIT_MGMT.OS_FILE_MAX_AGE property. Query the DBA_AUDIT_MGMT_CONFIG_PARAMS data dictionary view, described in Section 13.2.1, to find the current status of this property.
- USE_DEFAULT_VALUES: Specify one of the following values:
  - TRUE: Clears the current value and uses the default value, 5 days, instead.
  - FALSE: Oracle Database does not use a default maximum age for the operating system or XML file growth. In this case, the files will continue to age without limitation unless you configure the DBMS_AUDIT_MGMT.OS_FILE_MAX_SIZE property. The default setting is FALSE.

5

Managing Oracle Audit Vault Security

This chapter contains:

- About Managing Oracle Audit Vault Security
- Oracle Advanced Security – Secure Management Communication
- Oracle Advanced Security – Manage User Authentication Metadata
- Oracle Database Vault – Protects Oracle Audit Vault
- Oracle Database Vault – Provides Strong Access Controls

5.1 About Managing Oracle Audit Vault Security

Oracle Audit Vault uses the industry leading security capabilities of Oracle Database Vault and Oracle Advanced Security features to protect audit data from the moment it is collected, transmitted, consolidated, and stored in a centralized, protected, audit data repository.

This chapter provides an understanding of how to manage Oracle Audit Vault security. Audit Vault administrators should perform Oracle Audit Vault security tasks in this order of importance:

1. Secure management communication between Audit Vault Server and Audit Vault Collection Agent (see Section 5.2, "Oracle Advanced Security – Secure Management Communication").
2. Manage user authentication metadata (see Section 5.3, "Oracle Advanced Security – Manage User Authentication Metadata").

This chapter also includes the following additional sections as background information to assist Audit Vault administrators in understanding how Oracle Database Vault protects audit data and provides strong access control:

- Section 5.4, "Oracle Database Vault – Protects Oracle Audit Vault"
- Section 5.5, "Oracle Database Vault – Provides Strong Access Controls"

5.2 Oracle Advanced Security – Secure Management Communication

Oracle Audit Vault administrators can further secure management communication between the Audit Vault Server and the Audit Vault Collection Agent by using the **HTTPS** protocol to encrypt data. In this case, **X.509 certificate**s are provided by the Audit Vault administrator and are used for authentication. This is part of the postinstallation configuration of Oracle Audit Vault. Secure Sockets Layer (SSL) is configured for the mutual authentication between the Audit Vault management service on the server side and each collection agent over HTTPS. A Certificate Authority must provide these certificates to the Audit Vault administrator.

> **See Also:** *Oracle Database Advanced Security Administrator's Guide* for more information about about PKI-based authentication, digital certificates, and secure external password stores, and Oracle wallets.

Once Audit Vault Server and Audit Vault collection agent communication is secured using HTTPS, the browser must also use HTTPS to access the Audit Vault Console. There is no longer an HTTP protocol available for the browser user, because the browser to Audit Vault Console communication is also made secure.

Oracle XML Database HTTP server is configured to HTTP. Oracle XML Database HTTP server can be configured to HTTPS using the `AVCA secure_av` command as described in the next section. However, before you run this command, you must first follow these steps:

1. Generate a certificate request for Oracle XML Database using the `AVCA generate_csr` command.
2. Send this certificate request to a CA and get it signed and then returned to you.
3. Import this signed certificate into the wallet using the `AVCA import_cert` command.

Now you can proceed to configure both the Audit Vault Server and Oracle XML Database communication using the `AVCA secure_av` command as described in the next section.

Setting Up Mutual Authentication Between Audit Vault Server and Its Collection Agents

See *Oracle Database Advanced Security Administrator's Guide* for information about using Oracle Wallet Manager to obtain X.509 certificates from a Certificate Authority for the Audit Vault Collection Agent and importing them into the wallet. Use the **keytool** located at `$ORACLE_HOME/jdk/bin/keytool` to generate the **key store** if this becomes necessary. Once the key store and certificates are in place at the collection agent side, next set up mutual authentication between Audit Vault Server and its collection agents. To do this, use the AVCA secure_av command from the system where Audit Vault Server is installed. This operation secures Audit Vault Server by enabling mutual authentication with Oracle Audit Vault collection agent.

The AVCA secure_av command takes the following arguments:

- `-avkeystore <keystore location>` -- The key store location for Audit Vault
- `-avtruststore <truststore location>` -- The trust store location for Audit Vault

The following AVCA secure_av command secures Audit Vault Server by enabling mutual authentication with the Oracle Audit Vault collection agent.

```
avca secure_av -avkeystore /tmp/avkeystore -avtruststore /tmp/avkeystore
Enter keystore password: *******
```

From the system where the Oracle Audit Vault collection agent is installed, the `AVCA secure_agent` command secures the Oracle Audit Vault collection agent by enabling mutual authentication with the Audit Vault Server.

The `AVCA secure_agent` command takes the following arguments:

- `-agentkeystore <keystore location>` -- The key store location for this collection agent
- `-avdn <DN of Audit Vault>` -- The distinguished name (DN) of Audit Vault
- `-agentdn <DN of Collection Agent>` -- The DN of this Audit Vault Collection Agent

The following `AVCA secure_agent` command secures the Audit Vault Collection Agent by enabling mutual authentication with Audit Vault.

```
$ avca secure_agent -agentkeystore /tmp/agentkeystore
-agentdn "CN=agent1, OU=development, O=oracle, L=redwoodshores, ST=ca, C=us"
-avdn "CN=av1, OU=development, O=oracle, L=redwoodshores, ST=ca, C=us"
Enter keystore password: password
```

5.3 Oracle Advanced Security – Manage User Authentication Metadata

As part of the Audit Vault Server and the Oracle Audit Vault collection agent installation, two wallets are created. One wallet resides on the Audit Vault Server and this one contains the `AV_ADMIN` user's credentials and is used by the Audit Vault Console to communicate to the Audit Vault database. This Audit Vault Console provides the management service that initiates the communication with collection agents using HTTP. Audit Vault Configuration Assistant (`AVCA`) modifies the Database Control console `server.xml` file and other related files to enable Audit Vault management through the Oracle Enterprise Manager Database Control console. The wallet is located in the `$ORACLE_HOME/network/admin/avwallet` directory.

The other wallet resides on the Audit Vault Collection Agent and contains the `AV_AGENT` credentials and is used by the collection agent to get configuration data from Oracle Audit Vault. It is located in the `$ORACLE_HOME/network/admin/avwallet` directory. The collection agent-side wallet also contains the credentials used by the collectors to communicate to the source database, such as Oracle Database, Microsoft SQL Server database, or Sybase ASE database. These credentials are used by the three ORCLDB collectors, the MSSQLDB collector, and the SYBDB collector to connect to the source and to:

- Open a connection to the source database to read, extract, and send audit records to the Audit Vault repository
- Get metadata and metrics for all the collectors
- Start and stop the collectors
- Get audit settings as part of Audit Settings management for ORCLDB collectors

The Oracle wallet is a password-protected container that stores credentials, such as certificates, authentication credentials, and private keys, all of which are used by SSL for strong authentication. Oracle wallets are managed through Oracle Wallet Manager. Oracle Wallet Manager can perform tasks such as wallet creation, certificate request generation, and certificate import into the wallet.

Oracle Audit Vault uses third-party network authentication services, PKI-based authentication, to authenticate its user clients. Authentication systems based on **public key infrastructure** (**PKI**) issue digital certificates to user clients, which use them to authenticate directly to servers in the enterprise without directly involving an authentication server. These user certificates, along with the private key of the user and the set of trust points of a user (trusted certificate authorities), are stored in Oracle wallets.

5.4 Oracle Database Vault – Protects Oracle Audit Vault

Oracle Database Vault provides realms, separation of duty, command rules and factors as features that are applicable to reducing the overall risk associated with specific provisions of regulations worldwide. These regulations have common themes that include internal controls, separation of duty, and strong access controls on access to sensitive information. Technical solutions are required to mitigate the risks associated with items such as unauthorized modification of data and unauthorized access.

Oracle Database Vault realms prevent database administrators (DBAs), application owners, and other privileged users from viewing application data using their powerful privileges. Database Vault realms put in place preventive controls, helping reduce the potential impact when a data breach does occur, enabling the DBA to perform his or her job more effectively. Oracle Database Vault realms can be used to protect an entire application or a specific set of tables within an application, providing highly flexible and adaptable security enforcement. Oracle Audit Vault audit data is protected in this way.

Oracle Database Vault prevents highly privileged users (DBAs) from accessing audit data. It enforces a separation of duty by not allowing the same user granted two or more administrator roles to perform different responsibilities in the same session and optimally to have different administrator users be granted respective roles to perform these responsibilities in separate sessions.

Oracle Database Vault provides two roles, `DV_ACCTMGR` to manage database user accounts and `DV_OWNER` to manage database roles and configuration. The security administrator granted `DV_ACCTMGR` role can create, alter, and drop users and this user creates all Audit Vault administrator users. The security administrator granted `DV_OWNER` role can grant Oracle Database Vault roles. The Audit Vault administrator user granted the `AV_ADMIN` role grants all Audit Vault roles. Thus, two different highly privileged users are required one to create Audit Vault users and the other to grant these users Audit Vault roles. In this way, Oracle Database Vault and Oracle Audit Vault protect audit data from access, enforce protection of database structures from unauthorized change, and set a variety of access controls to implement dynamic and flexible security requirements. See Section 5.5 for more information about these Database Vault security administrator accounts, Audit Vault administrator accounts, and the core database user accounts.

Using Oracle Database Vault, highly privileged database users can be prevented from accessing application data. In addition, access to applications, databases, and data can be tightly controlled based on such variables as time of day, IP address or subnet.

5.5 Oracle Database Vault – Provides Strong Access Controls

Audit Vault is a secure data warehouse that consolidates audit data across an enterprise. The data is only visible to Audit Vault auditors once it is moved into the Audit Vault data warehouse. No user can access the audit data before it is moved to the Audit Vault data warehouse nor after it is purged from there. Even a `SYS` user cannot access this secure audit data. The default privilege that a `SYS` user will have is the ability to lock and unlock the Audit Vault schema. This extremely tight security is necessary to prevent audit trail data, which is extensive, detailed, and sensitive information, from being compromised. Oracle Database Vault features guarantee this level of security.

Audit Vault predefined administrator roles include:

- `AV_ADMIN` – Accesses Oracle Audit Vault services to administer, configure, and manage a running Oracle Audit Vault system. A user granted this role configures and manages audit sources, collection agents, collectors, the setup of the source with the collection agent, and the warehouse. Only the user granted the AV_ADMIN role can grant the appropriate role (AV_ADMIN and AV_AUDITOR) through SQL*Plus.

- AV_AUDITOR – Accesses Audit Vault reporting and analysis services to monitor components, detect security risks, create and evaluate alert scenarios, create detail and summary reports of events across systems, and manage the reports. A user granted this role manages central audit settings and alerts. This user also uses the data warehouse services to further analyze the audit data to assist in looking for trends, intrusions, anomalies, and other items of interest. A user is created and granted this role during the Audit Vault Server installation.
- AV_AGENT – Manages collection agents and collectors by starting, stopping, and resetting them. A user is created and granted this role prior to a collection agent installation. A user is created and granted this role (AVCA add_agent command) during collection agent registration. The Audit Vault Collection Agent software uses this role at run time to query Oracle Audit Vault for configuration information.
- AV_SOURCE – Manages the setup of sources for audit data collection. A user is created prior to source and collector configuration and granted this role upon adding a source to Audit Vault using the add_source command. The collector software uses this role at run time to send audit data to Audit Vault.
- DV_OWNER – Manages Oracle Database Vault roles and configuration.
- DV_ACCTMGR – Manages database user accounts. Only the user granted this role can create Audit Vault administrator users.

Table 5–1 shows the roles and privileges an administrative user is granted when that user is granted one of the high level Audit Vault or Database Vault roles. Typically, one user is granted an AV_ADMIN role and one user is optionally granted an AV_AUDITOR role as part of installing the Audit Vault Server. The user granted the AV_ADMIN role can be granted the AV_AUDITOR role if that user is not created during the Audit Vault Server installation.

Because Oracle Audit Vault is protected by Oracle Database Vault, only the user granted the DV_ACCTMGR role can create, alter, and drop users.

Table 5–1 Roles and Privileges Granted to Administrators Granted a Specific Audit Vault or Database Vault Role

Role Granted to User	Roles Granted	Privileges Granted

AV_ADMIN	DV_PUBLIC,
	AV_ADMIN,
	SELECT_CATALOG_ROLE,
	HS_ADMIN_ROLE,
	AQ_ADMINISTRATOR_ROLE,
	AQ_ADMINISTRATOR_ROLE,
	AV_AUDITOR,
	AV_AGENT
		CREATE SESSION,
		CREATE ANY VIEW,
		GRANT ANY ROLE,
		MANAGE ANY QUEUE,
		ENQUEUE ANY QUEUE,
		DEQUEUE ANY QUEUE,
		CREATE EVALUATION CONTEXT,
		CREATE RULE SET,
		CREATE RULE

AV_AUDITOR	DV_PUBLIC, AV_AUDITOR, SELECT_CATALOG_ROLE, HS_ADMIN_ROLE	CREATE SESSION

AV_AGENT	DV_PUBLIC,
	AV_AGENT
		CREATE SESSION,
		CREATE ANY VIEW

Table 5–1 (Cont.) Roles and Privileges Granted to Administrators Granted a Specific Audit Vault or Database Vault Role

Role Granted to User	Roles Granted	Privileges Granted

AV_SOURCE	DV_PUBLIC,
	RESOURCE,
	AV_SOURCE,
	AV_USER_ROLE
		CREATE SESSION,
		RESTRICTED SESSION,
		UNLIMITED TABLESPACE,
		CREATE TABLE,
		CREATE CLUSTER,
		CREATE SEQUENCE,
		CREATE DATABASE LINK,
		CREATE PROCEDURE,
		CREATE TRIGGER,
		CREATE TYPE,
		CREATE OPERATOR,
		CREATE INDEXTYPE,
		MANAGE ANY QUEUE,
		ENQUEUE ANY QUEUE,
		DEQUEUE ANY QUEUE,
		CREATE EVALUATION CONTEXT,
		CREATE RULE SET,
		CREATE ANY RULE SET,
		ALTER ANY RULE SET,
		EXECUTE ANY RULE SET,
		CREATE RULE,
		CREATE ANY RULE,
		ALTER ANY RULE,
		EXECUTE ANY RULE

DV_ACCTMGR	DV_PUBLIC, CONNECT, DV_ACCTMGR	CREATE SESSION, CREATE USER, ALTER USER, DROP USER, CREATE PROFILE, ALTER PROFILE, DROP PROFILE
DV_OWNER	DV_PUBLIC, CONNECT, DV_OWNER, DV_ADMIN, DV_SECANALYST	CREATE SESSION, GRANT ANY ROLE, ALTER ANY TRIGGER, ADMINISTER DATABASE TRIGGER

The Audit Vault roles are granted or revoked through the SQL*Plus interface using the SQL GRANT and REVOKE commands in the following way. All granting or revoking of Audit Vault roles or privileges is done through SQL*Plus by the user who has AV_ADMIN role granted. To add more users, a user must connect having DV_ACCTMGR role to create the users; however, this user cannot also grant these roles to these users. Only the user granted the AV_ADMIN role can then grant the appropriate role (AV_ADMIN and AV_AUDITOR), through SQL*Plus.

An Audit Vault administrator with one of these predefined roles granted can assume only one administrative responsibility at a time in a given session. For instance, if the Audit Vault administrator must perform a different task in another role, the same administrator must begin a new session to start that task.

Note: Users granted more than one Audit Vault role can only log in to the Audit Vault Console as a single role. They must log out and log in to an Audit Vault system again to use a different role. This security measure maintains a separation of duties within an Audit Vault system for each Audit Vault user.

Table 5–2 shows all other database core accounts created in the default Audit Vault installation. Operating system authentication to the database is allowed, remote authentication to the database "AS SYSDBA" is not allowed, but if needed can be enabled by use of the password file. See "Postinstallation Tasks" in the Oracle Audit Vault installation guides for more information about unlocking and resetting user passwords and enabling or disabling connections with the SYSDBA Privilege.

Table 5–2 Database Core Accounts Created and Privileges In Use

Account	Privileges	Privilege In Use or Not	Password to Use
SYS SYSTEM SYSMAN DBSNMP	Many	Yes	Same password as user granted AV_ADMIN role for basic installation or password may be set separately in advanced installation.
SYS AS or / AS	SYSDBA	Yes, allowed	Operating system authentication to the database is enabled by default.
SYS AS	SYSDBA	No, not allowed for remote connection	To use for remote connection, user must create a password file to enable its use. Password is set when password file is created.
SYS AS	SYSOPER	Yes, allowed	Same password as user granted AV_ADMIN role.

The following example shows how to add a new Audit Vault administrator auditor account, grant this new user the AV_AUDITOR role, then check this user's granted roles and privileges.

```
sqlplus avadmindva
Enter password: avadmindvapassword
Connected.
SQL> create user avauditor2 identified by Welcome_99;

User created.

SQL> connect avadmin
Enter password: avadminpassword
Connected.
SQL> grant AV_AUDITROR to avauditor2;

Grant succeeded.

SQL> connect avauditor2
Enter password: avauditor2password
Connected.
SQL> show user
USER is "AVAUDITOR2"
SQL> select * from session_roles;

ROLE
------------------------------
```

```
DV_PUBLIC
AV_AUDITOR
SELECT_CATALOG_ROLE
HS_ADMIN_ROLE

SQL> select * from session_privs;

PRIVILEGE
----------------------------------------
CREATE SESSION
```

The following example shows how to connect as the SYS user with SYSOPER privilege (using the clause AS SYSOPER), shut down the Audit Vault database, and then start it up again.

```
sqlplus sys/as sysoper
Enter password: sysoperpassword
Connected.
SQL> shutdown immediate
Database closed.
Database dismounted.
Oracle instance shut down.

SQL> startup
Oracle instance started.
Database mounted.
Database opened.
SQL> exit
```

6

Audit Vault Configuration Assistant (AVCA) Reference

Audit Vault Configuration Assistant (AVCA) is a command-line utility you use to manage various Audit Vault components, such as adding or dropping collection agents. When you run these commands, remember the following:

- **Enter the command in lower-case letters.** The commands are case sensitive.
- **When you open a shell to run the command, first set the appropriate environment variables.** See Section 2.2 for more information.

Table 6–1 describes the Audit Vault Configuration Assistant commands and where each is used, whether on the Audit Vault Server, on the Audit Vault collection agent, or in both places.

Table 6–1 Audit Vault Configuration Assistant Commands

Command	Used Where?	Description
add_agent	Server	Adds a collection agent to Oracle Audit Vault
create_credential	Both	Creates or updates a credential to be stored in the wallet
create_wallet	Agent	Creates a wallet to hold credentials
deploy_av	Server	Deploys the `av.ear` file to another node in an Oracle RAC environment
drop_agent	Server	Drops a collection agent from Oracle Audit Vault
generate_csr	Server	Generates a certificate request
help	Both	Displays Help for the `AVCA` commands
import_cert	Server	Imports the specified certificate into the wallet
redeploy	Both	Redeploys the `av.ear` file on the Audit Vault Server system or the `AVAgent.ear` file on the Audit Vault collection agent system
remove_cert	Server	Removes the specified certificate from the wallet
secure_agent	Collection Agent	Secures the Audit Vault collection agent by enabling mutual authentication with Audit Vault
secure_av	Server	Secures Audit Vault Server by enabling mutual authentication with the Audit Vault collection agent
set_warehouse_retention	Server	Controls the amount of data kept online in the data warehouse fact table

Table 6–1 (Cont.) Audit Vault Configuration Assistant Commands

Command	Used Where?	Description
set_warehouse_schedule	Server	Sets the schedule for refreshing data from the raw audit data store to the star schema

> **Note:** In an Oracle RAC environment, `AVCA` commands must be issued from the node on which Oracle Enterprise Manager resides. This is the same node on which the `av.ear` file is deployed.
>
> If the node on which the `av.ear` file is deployed is down, deploy the `av.ear` file to another node using the `AVCA deploy_av` command.

6.1 add_agent

Adds or registers a collection agent to Audit Vault. Run this command on the Audit Vault Server.

Syntax

```
avca add_agent -agentname agent_name [-agentdesc desc] -agenthost host
```

Arguments

Argument	Description
`-agentname` *agent_name*	Specify the collection agent (by collection agent name) to be added. To find a list of existing agents, query the `ADM_AGENTS` data dictionary view, described in Section 13.1.1.
`-agentdesc` *desc*	Optionally, specify a description of the collection agent.
`-agenthost` *host*	Specify an agent host name where this collection agent is to be installed.

Usage Notes

You will be prompted for the agent user name and agent user name password. See the example. To find the names of existing agent users, you can query the `ADM_AGENTS` data dictionary view, described in Section 13.1.1.

Example

```
$ avca add_agent -agentname TTAgent2 -agenthost stapj40

AVCA started
Adding agent...
Enter agent user name: agent_user_name
Enter agent user password: agent_user_pwd
Re-enter agent user password: agent_user_pwd
Agent added successfully.
```

6.2 create_credential

Creates or updates a credential to be stored in an Oracle wallet. Run this command on both the Audit Vault Server and Audit Vault collection agent as a script during collector development.

Syntax

```
avca create_credential -wrl wallet_location -dbalias db_alias
```

Arguments

Argument	Description
`-wrl` *`wallet_location`*	The location of the Audit Vault wallet. Locations are as follows: - **Linux and UNIX-based systems:** $ORACLE_HOME/network/admin/avwallet - **Windows systems:** ORACLE_HOME\network\ADMIN\avwallet
`-dbalias` *`db_alias`*	The database alias. In the Audit Vault Server home the database alias is the SID or Oracle instance identifier. You can find this SID by checking the `tnsnames.ora` file for the database instance. In the Audit Vault collection agent home, the database alias is always `av`.

Usage Notes

Use this command to create a new certificate if someone changes the source user password on the source, thus eventually breaking the connection between the collector and the source.

Example

```
$ avca create_credential -wrl $ORACLE_HOME/network/admin/avwallet -dbalias av

AVCA started
Storing user credentials in wallet...
Enter source user username: srcuser1
Enter source user password: password
Re-enter source user password: password
Create credential oracle.security.client.connect_string4
done.
```

6.3 create_wallet

Creates a wallet to hold credentials. Run this command on the Audit Vault collection agent.

Syntax

```
avca create_wallet -wrl wallet_location
```

Arguments

Argument	Description
-wrl *wallet_location*	The directory location for the wallet. Ensure that this directory already exists. Locations are as follows: ■ **Linux and UNIX-based systems:** $ORACLE_HOME/network/admin/avwallet ■ **Windows systems:** ORACLE_HOME\network\ADMIN\avwallet

Usage Notes

After you execute this command, `.sso` and `.p12` files are generated in the wallet location.

Example

The following example shows how to create a wallet in the location specified as `$T_WORK/tt_1`:

```
$ avca create_wallet -wrl $T_WORK/tt_1
Enter wallet password: password
```

6.4 deploy_av

Deploys the `av.ear` file to another node in an Oracle Real Application Clusters (Oracle RAC) environment. Run this command on the Audit Vault Server

Syntax

```
deploy_av -sid sid -dbalias db_alias -avconsoleport av_console_port
```

Arguments

Argument	Description
-sid *sid*	The Oracle Database system identifier (SID) for the instance. You can verify the SID by checking the `tnsnames.ora` file for the database instance.
-dbalias *db_alias*	The database alias
-avconsoleport *av_console_port*	The port number for the Audit Vault Console. You can find this number by entering the following command in the Audit Vault Server shell: `avctl show_av_status`

Usage Notes

In an Oracle RAC environment, `AVCA` commands must be issued from the node on which Oracle Enterprise Manager resides. This is the same node on which the `av.ear` file is deployed.

If the node on which the `av.ear` file is deployed is down, deploy the `av.ear` file to another node using the `avca deploy_av` command.

Note that when the avca `deploy_av` command is issued, a wallet containing the default `avadmin` entries is also created on the other node. However, other entries, such as the source user credentials must be added to the wallet using the `AVCA` create_credential command) being used that matches the collectors that are in use.

To use the Audit Vault Console from this other node, enter its host name or IP address (*host*) and port number (*port*) as you did previously in the Address field of the browser window (http://*host*:*port*/av), but replace the original host name or IP address with that for the other node.

Example

```
$ avca deploy_av -sid av -dbalias av -avconsoleport 5700
```

6.5 drop_agent

Drops (disables) a collection agent from Oracle Audit Vault. Run this command on the Audit Vault Server.

Syntax

```
avca drop_agent -agentname agent_name
```

Arguments

Argument	Description
-agentname *agent_name*	Specify the collection agent (by collection agent name) to be dropped from Oracle Audit Vault. To find a list of existing agents, query the ADM_AGENTS data dictionary view, described in Section 13.1.1.

Usage Notes

- The drop_agent command does not delete the collection agent from Oracle Audit Vault; it disables the collection agent. The user can neither add the same collection agent name again nor enable the dropped collection agent.
- Oracle Audit Vault displays an error if active collectors are still running in the collection agent.

Example

The following example shows how to drop a collection agent named sales_agt from Oracle Audit Vault:

```
$ avca drop_agent -agentname sales_agt

AVCA started
Dropping agent...
Agent dropped successfully.
```

6.6 generate_csr

Generates certificate requests. Run this command on the Audit Vault Server.

Syntax

```
generate_csr -certdn Audit_Vault_Server_host_DN [-keysize 512|1024|2048]
             -out certificate_request_output_ file
```

Arguments

Argument	Description
`-certdn` *`Audit_Vault_Server_host_DN`*	Distinguished name (DN) of the Audit Vault Server host
`keysize 512|1024|2048`	The key size (in bits). The default key size is 1024 bits.
`-out` *`certificate_request_output_file`*	The path and name of the certificate request output file

Usage Notes

You must use this command to generate certificate requests. After generating the certificate request, send it to your CA and get it signed and then returned as a signed certificate.

The DN of the Audit Vault Server is provided by the Audit Vault Administrator and is typically of the form:

```
CN=<hostname fully-qualified>,OU=<Org Unit>,O=<Organization>,ST=<State>,C=<Country>
```

Example

The following example shows how to generate a certificate request.

```
$ avca generate_csr -certdn CN=valid_AV_hostname,OU=DBSEC,O=Oracle,ST=CA,C=US -out cert_request.txt
```

6.7 help

Displays Help for the AVCA commands. Run this command on both the Audit Vault Server and Audit Vault collection agent.

Syntax

```
avca -help

avca command -help
```

Arguments

Argument	Description
`command`	The name of an AVCA command for which you want help messages to appear

Usage Notes

None

Example

The following example shows how to display general AVCA utility Help in the Audit Vault Server home.

```
$ avca -help

  --------------------------------------------
  AVCA Usage
  --------------------------------------------
```

```
Oracle Audit Vault Server Installation commands
    avca deploy_av -sid <sid> -dbalias <db alias> -avconsoleport <av console port>
    avca generate_csr -certdn <Audit Vault Server host DN> [-keysize 512|1024|2048]
                      -out <certificate request output file>
    avca import_cert -cert <User/Trusted certificate> [-trusted]
    avca remove_cert -certdn <Audit Vault Server host DN>
    avca secure_av -avkeystore <keystore location> -avtruststore <truststore location>
    avca secure_av -remove

Oracle Audit Vault Configuration commands - Agent:
    avca add_agent -agentname <agent name> [-agentdesc <desc>] -agenthost <host>
    avca drop_agent -agentname <agent name>

Oracle Audit Vault Configuration commands - Warehouse:
    avca set_warehouse_schedule -schedulename <schedule name>
    avca set_warehouse_schedule -startdate <start date> -rptintrv <repeat interval>
                               [-dateformat <date format>]
    avca set_warehouse_retention -intrv <year-month interval>

Oracle Audit Vault Agent Installation commands
    avca secure_agent -agentkeystore <keystore location> -avdn <DN of Audit Vault>
                      -agentdn <DN of agent>
    avca secure_agent -remove

Oracle Audit Vault Configuration commands - Authentication:
    avca create_wallet -wrl <wallet_location>
    avca create_credential -wrl <wallet_location> -wpwd <wallet_pwd> -dbalias <db alias>
                           -usr <usr>/<pwd>

avca -help
```

The following example shows how to display specific AVCA help for the add_agent command in Audit Vault.

```
$ avca add_agent -help

  avca add_agent -agentname <agent name> [-agentdesc <desc>] -agenthost <host>
  ------------------------------------------------
  -agentname <agent name>
  [-agentdesc <agent description>]
  -agenthost <agent host>
  ------------------------------------------------
```

This example shows how to display general AVCA utility Help in the Audit Vault collection agent home.

```
$ avca -help
  --------------------------------------------
  AVCA Usage
  --------------------------------------------
  Oracle Audit Vault Agent Installation commands
      avca secure_agent -agentkeystore <keystore location>
                        -avdn <DN of Audit Vault> -agentdn <DN of agent>
      avca secure_agent -remove

  Oracle Audit Vault Configuration commands - Authentication:
      avca create_wallet -wrl <wallet_location>
      avca create_credential -wrl <wallet_location> -wpwd <wallet_pwd>
                             -dbalias <db alias> -usr <usr>/<pwd>

  avca -help
```

6.8 import_cert

Imports the specified User or Trusted certificate into the wallet. Run this command on the Audit Vault Server.

Syntax

```
import_cert -cert User/Trusted_certificate [-trusted]
```

Arguments

Argument	Description
`-cert` *`User/Trusted_certificate`*	The path and file name of the certificate to be imported into the wallet
`-trusted`	Optional. A key word to indicate whether the certificate is a Trusted or CA certificate

Usage Notes

This certificate must match a pending certificate request in the wallet. The Trusted or CA certificate for this certificate must be imported first.

Example

The following example shows how to import a user certificate into the wallet.

```
$ avca import_cert -cert user_certificate.cer
```

This example shows how to import a trusted certificate into the wallet.

```
$ avca import_cert -cert ca_certitificate.cer -trusted
```

6.9 redeploy

Redeploys the `av.ear file` on the Audit Vault Server system or the `AVAgent.ear` file on the Audit Vault collection agent system.

Syntax

```
avca redeploy
```

Arguments

None

Usage Notes

None

Example

The following example shows how to redeploy either the `av.ear` file on the Audit Vault Server system or the `AVAgent.ear` file on the Audit Vault collection agent system.

```
$ avca redeploy
```

6.10 remove_cert

Removes the specified certificate from the wallet. Run this command on the Audit Vault Server.

Syntax

```
remove_cert -cert Audit_Vault_Server_host_DN
```

Arguments

Argument	Description
`-cert` *`Audit_Vault_Server_host_DN`*	Distinguished name (DN) of the Audit Vault Server host

Usage Notes

The Certificate or Key pair for the DN matching the given DN will be removed from the wallet.

You can use this command, for example, to remove a certificate that expires or is revoked by the CA, and replace it with a renewed certificate.

The DN of the Audit Vault Server is provided by the Audit Vault Administrator and is typically of the form:

```
CN=<hostname fully-qualified>,OU=Org_Unit,O=<Organization>,ST=<State>,C=<Country>
```

Example

The following example shows how to remove a certificate from the wallet.

```
$ avca remove_cert -certdn CN=AV_Server_host_DN,OU=DBSEC,O=Oracle,ST=CA,C=US
```

6.11 secure_agent

Secures the Audit Vault collection agent by enabling mutual authentication with the Audit Vault Server. Run this command on the Audit Vault collection agent. This command also removes mutual authentication with Audit Vault Server.

Syntax

```
avca secure_agent -agentkeystore keystore_location
 -avdn Audit_Vault_Server_host_DN
 -agentdn agent_DN [-agentkeystore_pwd ketstore_pwd]

avca secure_agent -remove
```

Arguments

Argument	Description
`-agentkeystore` *`keystore_location`*	Specify the key store location for this collection agent.

Argument	Description
`-agentkeystorepwd` *`ketstore_pwd`*	Specify the key store password for Audit Vault Server. The `-agentkeystorepwd` argument can be omitted if the corresponding environment variable, `AVCA_AGENTKEYSTOREPWD` is set to *`keystore password`*. If the command-line argument `-agentkeystorepwd` is specified, then the command-line argument overrides the environment variable. This argument is provided for backward compatibility. For password handling security, do not specify this argument on the command-line nor use the environment variable. Instead, let the command prompt you for the key store password. See the example.
`-avdn` *`Audit_Vault_Server_host_DN`*	Distinguished name (DN) of the Audit Vault Server
`-agentdn` *`agent_DN`*	DN of this Audit Vault collection agent
`-remove`	Keyword to indicate removing mutual authentication with Audit Vault Server

Usage Notes

- The key store and certificate must be in place at the collection agent side before you execute this command.
- Use the following command to generate a key store:

  ```
  $ORACLE_HOME/jdk/bin/keytool
  ```

- When you issue the `secure_agent` command for the specified collection agent with both the collection agent and its collectors in a running state, the collection agent and all its collectors will shut down when the agent OC4J shuts down and then restarts. You must manually restart the collection agent and its collectors.

Example

The following example shows how to secure the Audit Vault collection agent by enabling mutual authentication with the Audit Vault Server.

```
$ avca secure_agent -agentkeystore /tmp/agentkeystore
  -agentdn "CN=agent1, OU=development, O=oracle, L=redwoodshores, ST=ca, C=us"
  -avdn "CN=av1, OU=development, O=oracle, L=redwoodshores, ST=ca, C=us"
Enter keystore password: *******
```

The following example shows how to unsecure the Oracle Audit Vault collection agent by disabling mutual authentication with the Audit Vault Server.

```
$ avca secure_agent -remove

AVCA started
Restarting OC4J...
OC4J restarted successfully.
```

6.12 secure_av

Secures Audit Vault Server by enabling mutual authentication with the Audit Vault collection agent. Run this command on the Audit Vault Server. This command also removes mutual authentication with Audit Vault collection agent.

Syntax

```
avca secure_av -avkeystore keystore_location -avtruststore truststore_location
               [-avkeystorepwd ketstore_pwd>]

avca secure_av -remove
```

Arguments

Argument	Description
`-avkeystore` *`keystore_location`*	Specify the key store location for Audit Vault Server.
`-avkeystorepwd` *`ketstore_pwd`*	Specify the key store password for Audit Vault Server. The `-avkeystorepwd` argument can be omitted if the corresponding environment variable, `AVCA_ AVKEYSTOREPWD` is set to *`keystore password`*. If the command-line argument `-avkeystorepwd` is specified, then the command-line argument overrides the environment variable. This argument is provided for backward compatibility. For password handling security, do not specify this argument on the command-line nor use the environment variable. Instead, let the command prompt you for the key store password. See the example.
`-avtruststore` *`truststore_location`*	Specify the **trust store** location for Audit Vault Server.
`-remove`	Keyword to indicate removing mutual authentication with the Audit Vault collection agent.

Usage Notes

- The key store and certificate must be in place at Audit Vault Server before you execute this command.
- Use the following command to generate a key store:

  ```
  $ORACLE_HOME/jdk/bin/keytool
  ```

- When you issue the `secure_av` command, the Audit Vault Console agent OC4J will shut down and start up again, requiring you to log in to Audit Vault Console again.

Example

The following example shows how to secure Audit Vault Server by enabling mutual authentication with the Oracle Audit Vault collection agent.

```
$ avca secure_av -avkeystore /tmp/avkeystore

-avtruststore /tmp/avkeystore
```

```
Enter keystore password: password
```

The following example shows how to unsecure Audit Vault Server by disabling mutual authentication with the Audit Vault collection agent.

```
$ avca secure_av -remove

AVCA started
Stopping OC4J...
OC4J stopped successfully.
Starting OC4J...
OC4J started successfully.
Oracle Audit Vault 10g Database Control Release 10.2.3.0.0  Copyright (c)
1996,2008 Oracle Corporation.  All rights reserved.
http://stacd05.us.oracle.com:5700/av
Oracle Audit Vault 10g is running.
------------------------------------

Logs are generated in directory /scratch/10.2.2/av_1/av/log
```

6.13 set_warehouse_retention

Controls the amount of data kept online in the data warehouse fact table. Run this command on the Audit Vault Server.

Syntax

```
avca set_warehouse_retention -intrv year_month_interval
```

Arguments

Argument	Description
`-intrv` *year_month_interval*	Specify the year month interval in the form [+]YY-MM.

Usage Notes

- The interval must be positive.
- The data loaded using the `avctl refresh_warehouse` command is removed automatically based on the warehouse retention specified using the `AVCA set_warehouse_retention` command.
- See Section 3.4 for detailed information about creating a retention period.

Example

The following example shows how to control the amount of data kept online in the data warehouse table. In this case, a time interval of one year is specified.

```
$ avca set_warehouse_retention -intrv +01-00

AVCA started
Setting warehouse retention period...
done.
```

6.14 set_warehouse_schedule

Sets the schedule for refreshing data from the raw audit data store to the star schema. Run this command on the Audit Vault Server.

Syntax

```
avca set_warehouse_schedule -schedulename schedule_name

avca set_warehouse_schedule -startdate start_date
     -rptintrv repeat_interval [-dateformat date_format]
```

Arguments

Argument	Description
`-schedulename` *schedule_name*	Specify the schedule name created using the `DBMS_SCHEDULER.create_schedule` procedure. To find the names of existing schedules created with the `DBMS_SCHEDULE` package, query the `ALL_SCHEDULER_JOBS` data dictionary view. See *Oracle Database Reference* for more information.
`-startdate` *start_date*	Specify the start date for a warehouse refresh job using the default format DD-MON-YY. To use a different format, specify the `-dateformat` argument.
`-rptintrv` *repeat_interval*	Specify the repeat interval for the schedule using the syntax used in the `DBMS_SCHEDULER.create_schedule` procedure.
`-dateformat` *date_format*	Optionally, specify the date format for the `-startdate` argument.

Usage Notes

- You can select an existing schdule that was created with the `DBMS_SCHEDULER.create_schedule` PL/SQL procedure, or you can set the schedule by providing the start date and repeat interval.
- The following are error conditions:
  - The schedule name argument must be a valid schedule created using the `DBMS_SCHEDULER.create_schedule` procedure.
  - The repeat interval argument must be a valid interval specification consistent with the `DBMS_SCHEDULER` package.
- See Section 3.4 for detailed information about creating a refresh schedule.

Example

The following examples show how to set the schedule for refreshing data from the raw audit data store to the star schema by schedule name and by start date using the `avca set_warehouse_schedule` command.

The first example uses a schedule name argument based on a valid schedule created using the `DBMS_SCHEDULER.create_schedule` procedure.

```
avca set_warehouse_schedule -schedulename daily_refresh

$ AVCA started
Set warehouse schedule...
done.
```

This example uses a start date and repeat interval argument.

```
$ avca set_warehouse_schedule -startdate 01-JUL-06 -rptintrv 'FREQ=DAILY;BYHOUR=0'
```

```
AVCA started
Set warehouse schedule...
done.
```

The following example uses a start date with a specified date format and a repeat interval argument.

```
$ avca set_warehouse_schedule -startdate 01-07-2006 -dateformat 'DD-MM-YYYY'

-rptintrv 'FREQ=DAILY;BYHOUR=0'
AVCA started
Set warehouse schedule...
done.
```

7

Audit Vault Control (AVCTL) Reference

Use the Audit Vault Control (AVCTL) command-line utility to manage various Audit Vault components, such as checking the status of collector agents or managing the Audit Vault Data Warehouse. When you run these commands, remember the following:

- **Enter the command in lower-case letters.** The commands are case sensitive.
- **When you open a shell to run the command, first set the appropriate environment variables.** See Section 2.2 for more information.

Table 7–1 describes the Audit Vault Control commands and where each is used, whether on the Audit Vault Server, on the Audit Vault collection agent, or in both places.

Table 7–1 Audit Vault Control Commands

Command	Where Used	Description
-help	Both	Displays Help for the AVCTL commands
load_warehouse	Server	Loads older data from the raw audit data store into the data warehouse tables for analysis
purge_warehouse	Server	Purges audit data that was reloaded into the warehouse
refresh_warehouse	Server	Refreshes the data warehouse with the data in the raw audit data store since the last refresh operation.
show_agent_status	Server	Shows the status (metric) of a collection agent
show_av_status	Server	Shows the status (metric) of the Audit Vault Console
show_collector_status	Server	Shows the status (metric) of a collector
show_oc4j_status	Collection Agent	Shows the status (metric) of OC4J
start_agent	Server	Starts the collection agent
start_av	Server	Starts the Audit Vault Console
start_collector	Server	Starts the collector
start_oc4j	Collection Agent	Starts the agent OC4J
stop_agent	Server	Stops the collection agent
stop_av	Server	Stops the Audit Vault Console
stop_collector	Server	Stops the collector

Table 7–1 (Cont.) Audit Vault Control Commands

Command	Where Used	Description
stop_oc4j	Collection Agent	Stops the agent OC4J

> **Note:** In an Oracle RAC environment, you must issue the AVCTL commands from the node on which Oracle Enterprise Manager resides. This is the same node on which the `av.ear` file is deployed.
>
> If the node on which the `av.ear` file is deployed is down, deploy the `av.ear` file to another node using the AVCA `deploy_av` command.

7.1 -help

Displays Help for the AVCTL commands. You can run this command on both the Audit Vault Server and the Audit Vault collection agent.

Syntax

```
avctl -help

avctl command -help
```

Arguments

Argument	Description
command	The name of an AVCTL command for which you want Help to appear

Usage Notes

None.

Example

The following example shows how to display general AVCTL utility Help in the Audit Vault Server home.

```
$ avctl -help

  --------------------------------------------
  AVCTL Usage
  --------------------------------------------
  Oracle Audit Vault Control commands - AV Server:
      avctl start_av [-loglevel error|warning|info|debug]
      avctl stop_av
      avctl show_av_status

  Oracle Audit Vault Control commands - Agent:
      avctl start_agent -agentname <agent name>
      avctl stop_agent -agentname <agent name>
      avctl show_agent_status -agentname <agent name>

  Oracle Audit Vault Control commands - Collector:
      avctl start_collector -collname <collector name> -srcname <source name>
      avctl stop_collector -collname <collector name> -srcname <source name>
      avctl show_collector_status -collname <collector name> -srcname <source
name>

  Oracle Audit Vault Control commands - Warehouse:
      avctl refresh_warehouse [-wait]
      avctl load_warehouse -startdate <start date> -numofdays <num of days>
[-dateformat <date format>] [-wait]
      avctl purge_warehouse -startdate <start date> -numofdays <num of days>
[-dateformat <date format>] [-wait]

  avctl -help
```

The following example shows how to display specific AVCTL Help for the start_agent command in Audit Vault.

```
$ avctl start_agent -help
  avctl start_agent -agentname <agent name>
  ------------------------------------------------
  -agentname <agent name>
  ------------------------------------------------
```

7.2 load_warehouse

Loads audit trail data from the raw audit data store after it has been removed from the warehouse repository due to the retention period that was set. Run this command on the Audit Vault Server.

Syntax

```
avctl load_warehouse -startdate start_date>-numofdays num_of_days
                    [-dateformat date_format] [-wait]
```

Arguments

Argument	Description
-startdate *start_date*	Specify the start date for the audit trail data to be loaded into the data warehouse repository using the default format DD-MON-YY. To use a different format, specify the -dateformat argument.
-numofdays *num_of_days*	Specify the number of days' worth of audit trail data to be loaded.
-dateformat *date_format*	Optionally, specify the date format for the -startdate argument.
-wait	Optionally, specify that the command wait for the load job to complete. If you do not specify this argument, a DBMS job is started, and the command returns immediately.

Usage Notes

- The audit records received from the value of the -startdate argument for the given number of days specified by the -numofdays argument will be loaded into the data warehouse.
- See Section 3.4 for more information about managing the Oracle Audit Vault data warehouse.

Example

The following example shows how to load the data warehouse with 10 days' worth of audit data beginning with January 1, 2004:

```
$ avctl load_warehouse -startdate 01-JAN-04 -numofdays 10

AVCTL started
Loading older audit records into warehouse...
done.
```

The following example shows how to load the data warehouse with 10 days' worth of audit data beginning with January 1, 2004 using the DD/MM/YYYY date format, and to specify that the operation wait until the previous load job completes.

```
$ avctl load_warehouse -startdate 01/01/2004 -numofdays 10 -dateformat DD/MM/YYYY -wait

AVCTL started
Loading older audit records into warehouse...
done.
```

7.3 purge_warehouse

Purges audit trail data from the warehouse repository that was previously reloaded into the warehouse using the `avctl load_warehouse` command. Run this command on the Audit Vault Server.

Syntax

```
avctl purge_warehouse -startdate start_date -numofdays num_of_days
                     [-dateformat date_format] [-wait]
```

Arguments

Argument	Description
`-startdate` *`start_date`*	Specify the start date for the events to be removed from the data warehouse tables using the default format DD-MON-YY. To use a different format, specify the `-dateformat` argument.
`-numofdays` *`num_of_days`*	Specify the number of days' worth of data to be removed.
`-dateformat` *`date_format`*	Optionally, specify the date format for the `-startdate` argument.
`-wait`	Optionally, specify that the command wait for the purge job to complete. If this argument is not specified, a DBMS job is started, and the command returns immediately.

Usage Notes

- The audit records received from the `-startdate` argument for the given number of days specified by the `-numofdays` argument will be removed from the data warehouse tables.
- Only data loaded using the `avctl load_warehouse` command can be purged using the purge_warehouse command. The data loaded using the `avctl refresh_warehouse` command is removed automatically based on the

warehouse duration specified using the `avca set_warehouse_retention` command.

- See Section 3.4 for more information about managing the Oracle Audit Vault data warehouse.

Example

The following example shows how to purge 10 days' worth of data from the data warehouse beginning with January 1, 2004:

```
$ avctl purge_warehouse -startdate 01-JAN-04 -numofdays 10

AVCTL started
Purging older audit records from warehouse...
done.
```

The following example shows how to purge 10 days' worth of data from the data warehouse beginning with January 1, 2004 and to specify that the operation wait until the previous purge job completes:

```
$ avctl purge_warehouse -startdate 01-JAN-04 -numofdays 10 -wait

AVCTL started
Purging older audit records from warehouse...
Waiting for purge to complete...
done.
```

The following example shows how to purge 10 days' worth of data from the data warehouse beginning with January 1, 2004 using the date format of DD/MM/YYYY.

```
$ avctl purge_warehouse -startdate 01/01/2004 -numofdays 10 -dateformat DD/MM/YYYY

AVCTL started
Purging older audit records from warehouse...
done.
```

7.4 refresh_warehouse

Refreshes the data warehouse repository with the data from the raw audit data store since the last refresh operation. Run this command on the Audit Vault Server.

Syntax

```
avctl refresh_warehouse [-wait]
```

Arguments

Argument	Description
`-wait`	Optionally, specify that the command wait for the refresh job to complete. If this argument is not specified, a DBMS job is started, and the command returns immediately.

Usage Notes

- The last refresh operation could have been an explicit refresh using this command or a scheduled refresh based on the schedule set using the AVCA `set_warehouse_schedule` command.

- See Section 3.4 for more information about managing the Oracle Audit Vault data warehouse.

Example

The following example shows how to refresh the data warehouse:

```
$ avctl refresh_warehouse

AVCTL started
Refreshing warehouse...
done.
```

This example shows how to specify that the refresh operation wait until the previous refresh job completes before refreshing the data warehouse:

```
$ avctl refresh_warehouse -wait

AVCTL started
Refreshing warehouse...
Waiting for refresh to complete...
done.
```

7.5 show_agent_status

Shows the status (metric) of a collection agent. Run this command on the Audit Vault Server.

Syntax

```
avctl show_agent_status -agentname agent_name
```

Arguments

Argument	Description
-agentname *agent_name*	Specify the collection agent (by collection agent name). To find a list of existing agents, query the ADM_AGENTS data dictionary view, described in Section 13.1.1.

Usage Notes

None

Example

The following example shows the collection agent status for the sales_agt agent:

```
$ avctl show_agent_status -agentname SALES_AGT

AVCTL started
Getting agent metrics...
--------------------------------
Agent is running
--------------------------------
Metrics retrieved successfully.
```

7.6 show_av_status

Shows the Audit Vault Console status or the metric of the Audit Vault Server. Run this command on the Audit Vault Server.

Syntax

```
avctl show_av_status
```

Arguments

None

Usage Notes

When the Audit Vault Console becomes inaccessible, issue this command to determine its status.

Example

The following example shows the Audit Vault Console status:

```
$ avctl show_av_status

AVCTL started
Oracle Audit Vault 10g Database Control Release 10.2.3.0.0  Copyright (c) 1996,
 2008 Oracle Corporation.  All rights reserved.
http://hrdb.us.example.com:5570/av
Oracle Audit Vault 10g is running.
------------------------------------
Logs are generated in directory /oracle/product/10.2.3/av_1/av/log
```

7.7 show_collector_status

Shows the status (metric) of a collector. Run this command on the Audit Vault Server.

Syntax

```
avctl show_collector_status -collname collector_name -srcname source_name
```

Arguments

Argument	Description
-collname *collector_name*	Specify the target collector (by collector name). To find a list of collectors and their associated source database names, query the ADM_COLLECTORS data dictionary view, described in Section 13.1.3.
-srcname *source_name*	Specify the source database (by source name) to which this collector belongs.

Usage Notes

None

Example

The following example shows the collector status for the DBAUD_Collector collector:

```
$ avctl show_collector_status -collname DBAUD_Collector
                              -srcname RODSRC1.US.EXAMPLE.COM
```

```
AVCTL started
Getting collector metrics...
--------------------------------
Collector is running
Records per second  =  0.00
Bytes per second  =  0.00
--------------------------------
```

7.8 show_oc4j_status

Shows the OC4J status (metric). Run this command on the Audit Vault collection agent.

Syntax

```
avctl show_oc4j_status
```

Arguments

None

Usage Notes

None

Example

The following example shows the OC4J status for when it is running and when it is not running:

```
$ avctl show_oc4j_status

AVCTL started
------------------------------------
OC4J is running
------------------------------------
```

This example shows the OC4J status for when it is not running:

```
$ avctl stop_oc4j

AVCTL started
Stopping OC4J...
OC4J stopped successfully.

$ avctl show_oc4j_status
AVCTL started
------------------------------------
OC4J is not running
------------------------------------
```

7.9 start_agent

Starts the specified collection agent. Run this command on the Audit Vault Server.

Syntax

```
avctl start_agent -agentname agent_name
```

Arguments

Argument	Description
`-agentname` *`agent_name`*	Specify the collection agent (by collection agent name) to be started. To find a list of existing agents, query the `ADM_AGENTS` data dictionary view, described in Section 13.1.1.

Usage Notes

- On successful completion of this command, the collection agent is moved to a RUNNING state. If an error is encountered, the collection agent is moved to an ERROR state.
- Audit Vault accepts audit records only from collection agents in the RUNNING state.
- If you set the `NLS_LANG` environment value before performing an `avctl start_oc4j` command in the Audit Vault Agent shell and performing an `avctl start_agent` command or `avctl start_collector` command in the Audit Vault Server shell, it will ensure that the `avctl start_collector` command will succeed with a multibyte source name or collector name.

Example

The following example shows how to start the collection agent in Oracle Audit Vault:

```
$ avctl start_agent -agentname sales_agt

AVCTL started
Starting Agent...
Agent started successfully.
```

7.10 start_av

Starts the Audit Vault Console. Run this command on the Audit Vault Server.

Syntax

```
avctl start_av [-loglevel level]
```

Arguments

Argument	Description
`-loglevel` *`level`*	Optionally, specify the desired level of logging from the following options: ▪ `error` ▪ `warning` ▪ `info` ▪ `debug`

Usage Notes

This command executes the `emctl start dbconsole` command.

Example

The following example shows how to start the Audit Vault Console:

```
$ avctl start_av

AVCTL started
Starting OC4J...
OC4J started successfully.
Oracle Audit Vault 10g Database Control Release 10.2.3.0.0  Copyright (c)
1996,2008 Oracle Corporation.  All rights reserved.
http://atacw05.us.oracle.com:5700/av
Oracle Audit Vault 10g is running.
------------------------------------
Logs are generated in directory /oracle/product/10.2.3/av_1/av/log
```

7.11 start_collector

Starts the collector. Run this command on the Audit Vault Server.

Syntax

`avctl start_collector -collname` *`collector_name`* `-srcname` *`source_name`*

Arguments

Argument	Description
`-collname` *`collector_name`*	Specify the collector (by collector name) to be started. To find a list of collectors and their associated source database names, query the `ADM_COLLECTORS` data dictionary view, described in Section 13.1.3.
`-srcname` *`source_name`*	Specify the name of the source database to which the collector (specified in the `-collname` argument) belongs.

Usage Notes

- On successful completion of this command, the collector is moved to a RUNNING state. If an error is encountered, the collector is moved to an ERROR state.
- Audit Vault accepts audit records only from collectors in the RUNNING state.
- If you set the `NLS_LANG` environment value before performing an `avctl start_oc4j` command in the Audit Vault Agent shell and performing an `avctl start_agent` command or `avctl start_collector` command in the Audit Vault Server shell, it will ensure that the `avctl start_collector` command will succeed with a multibyte source name or collector name.

Example

The following example shows how to start the collector in Oracle Audit Vault:

```
$ avctl start_collector -collname REDO_Collector -srcname ORCLSRC1.EXAMPLE.COM

AVCTL started
Starting Collector...
Collector started successfully.
```

7.12 start_oc4j

Starts the agent OC4J. Run this command on the Audit Vault collection agent.

Syntax

```
avctl start_oc4j [-loglevel level]
```

Arguments

Argument	Description
-loglevel *level*	Optionally, specify the desired level of logging from the following options: - error - warning - info - debug

Usage Notes

If you set the NLS_LANG environment value before performing an avctl start_oc4j command in the Audit Vault Agent shell and performing an avctl start_agent command or avctl start_collector command in the Audit Vault Server shell, it will ensure that the avctl start_collector command will succeed with a multibyte source name or collector name.

Example

The following example shows how to start OC4J:

```
$ avctl start_oc4j

AVCTL started
Starting OC4J...
OC4J started successfully.
```

7.13 stop_agent

Stops the collection agent. Run this command on the Audit Vault Server.

Syntax

```
avctl stop_agent -agentname agent_name
```

Arguments

Argument	Description
-agentname *agent_name*	Specify the collection agent (by collection agent name) to be stopped. To find a list of existing agents, query the ADM_AGENTS data dictionary view, described in Section 13.1.1.

Usage Notes

- This command will first stop all collectors running at this collection agent, and then stop the collection agent itself.
- On successful completion of this command, the collection agent and its collectors are moved to a STOPPED state.

- If an error is encountered, Oracle Audit Vault moves the collection agent to an ERROR state. Oracle Audit Vault accepts audit records only from collection agents in the RUNNING state.

Example

The following example shows how to stop the collection agent in Oracle Audit Vault:

```
$ avctl stop_agent -agentname sales_agt

AVCTL started
Stopping Agent...
Agent stopped successfully.
```

7.14 stop_av

Stops the Audit Vault Console. Run this command on the Audit Vault Server.

Syntax

```
avctl stop_av
```

Arguments

None

Usage Notes

Oracle Audit Vault includes Enterprise Management Database Control as part of the user interfaces. When you issue the `stop_av` commend, it not only shuts down the Audit Vault Console, but it also stops Enterprise Management Database Control as well by executing the `emctl stop dbconsole` command. You do not need to issue the `emctl` commands separately.

Example

The following example shows how to stop the Audit Vault Console:

```
$ avctl stop_av

AVCTL started
Stopping OC4J...
OC4J stopped successfully.
```

7.15 stop_collector

Stops the collector. Run this command on the Audit Vault Server.

Syntax

```
avctl stop_collector -collname collector_name -srcname source_name
```

Arguments

Argument	Description
`-collname` *collector_name*	Specify the collector (by collector name) to be stopped. To find a list of collectors and their associated source database names, query the ADM_COLLECTORS data dictionary view, described in Section 13.1.3.

Argument	Description
`-srcname` *`source_name`*	Specify the name of the source database to which the collector (specified in the `-collname` argument) belongs.

Usage Notes

- On successful completion of this command, Oracle Audit Vault moves the collector a `STOPPED` state.
- If an error is encountered, the collector is moved to an `ERROR` state.
- Oracle Audit Vault accepts audit records only from collectors in the `RUNNING` state.

Example

The following example shows how to stop the collector in Oracle Audit Vault:

```
$ avctl stop_collector -collname STREAMSCOLLECTOR

-srcname ORCL.REGRESS.RDBMS.DEV.US.ORACLE.COM
AVCTL started
Stopping Collector...
Collector stopped successfully.
```

7.16 stop_oc4j

Stops the agent OC4J. Run this command on the Audit Vault collection agent.

Syntax

```
avctl stop_oc4j
```

Arguments

None

Usage Notes

None

Example

The following example shows how to stop OC4J:

```
$ avctl stop_oc4j

AVCTL started
Stopping agent OC4J...
OC4J stopped successfully.
```

8 Audit Vault Oracle Database (AVORCLDB) Utility Commands

Use the Audit Vault Oracle Database (AVORCLDB) command-line utility to manage the relationship between Oracle Audit Vault and source databases and collectors. When you run these commands, remember the following:

- **Enter the command in lower-case letters.** The commands are case sensitive.
- **When you open a shell to run the command, first set the appropriate environment variables.** See Section 2.2 for more information.

Table 8–1 describes the AVORCLDB commands and where each is used, whether on the Audit Vault Server, on the Audit Vault collection agent, or in both places.

Table 8–1 AVORCLDB Commands

Command	Where Used?	Description
add_collector	Server	Adds a collector to Audit Vault
add_source	Server	Registers an audit source with Audit Vault
alter_collector	Server	Alters the attributes of a collector
alter_source	Server	Alters the attributes of a source
drop_collector	Server	Drops a collector from Audit Vault
drop_source	Server	Drops a source from Audit Vault
-help	Both	Displays Help for the AVORCLDB commands
setup	Collection Agent	Adds the source user credentials to the wallet, creates a database alias in the wallet for the source user, and verifies the connection to the source using the wallet
verify	Both	Verifies that the source is compatible with the collectors that are specified for setup

8.1 avorcldb

The AVORCLDB command-line utility.

Syntax

```
avorcldb command -help

avorcldb command [options] arguments
```

Arguments

Argument	Description
command	Specify one of the following commands: `add_source`, `alter_source`, `drop_source`, `add_collector`, `alter_collector`, `drop_collector`, `setup`, or `verify`
arguments	Specify one or more of the `AVORCLDB` command arguments.
`-help`	Displays Help for the `AVORCLDB` commands.

Usage Notes

Issuing an `AVORCLDB` command generates the following log file: `$ORACLE_HOME/av/log/avorcldb.log`.

8.2 add_collector

Adds a collector for the given source to Audit Vault. Oracle Audit Vault verifies the source for requirements of the collector. Run this command on the Audit Vault Server.

Syntax

```
avorcldb add_collector -srcname srcname
-agentname agentname -colltype [OSAUD,DBAUD,REDO]
[-collname collname] [-desc desc]
[-av host:port:service] [-instname instname] [-orclhome orclhome]
```

Arguments

Argument	Description
`-srcname` *srcname*	Specify the source database name for which the collector is to be added. Remember that the source database name is case sensitive. To find a listing of of existing source database names and their associated collectors, query the `ADM_COLLECTORS` data dictionary view. See Section 13.1.3.
`-agentname` *agentname*	Specify the name of the collection agent that was created when you ran the `avca add_agent` command. The `ADM_COLLECTORS` data dictionary view lists agent names that have been associated with existing source databases.
`-colltype` *colltype*	Specify the collector type to be added. ■ `DBAUD` ■ `OSAUD` ■ `REDO` See Table 1–4 on page 1-4 for more information about the collector types.
`-collname` *collname*	Create a name for the collector. Optional. If you do not create a name, Oracle Audit Vault names the collector *colltype*`_Collector` instead, for example, `OSAUD_Collector` for the OSAUD collector type.
`-desc` *desc*	Enter a brief description of the collector. Optional.

Argument	Description
-av *host*:*port*:*service*	Specify the connection information for Audit Vault used for the database link from the source database to Audit Vault. You must include this argument if the `-colltype` argument is REDO; otherwise, this argument is optional.
-instname *instname*	Specify the instance name of Audit Vault Oracle RAC installation. You must include this argument if you are adding mulitple OSAUD collectors, that is, one collector for each database instance.
-orclhome *orclhome*	Specify the Oracle home of the source database.You must include this argument if the `-colltype` argument is OSAUD; otherwise, this argument is optional. See the usage notes.

Usage Notes

- Run any collector-specific preparation scripts before you execute the avca `add_collector` command.
- On Windows systems, specifying the OSAUD collector type automatically includes the Event Log and XML audit trails.
- When specifying the value for the `-orclhome` argument, enter the value as either a quoted string using a backslash (for example, `-orclhome "c:\app\oracle\product\10.2.3\av_1"`) or as a non-quoted string using a slash (for example, `-orclhome c:/app/oracle/product/10.2.3/av_1`).
- There is a 2 GB audit file size limit for the OSAUD collector to be able to collect audit records from audit trails stored in files, which includes the `SYSLOG`, `.AUD`, and `.XML` files. If a file size greater than 2 GB is encountered, the OSAUD collector ignores all audit records beyond 2 GB. To control the size of the operating system audit trail and select the audit trail type to set, set the `DBMS_AUDIT_MGMT.OS_FILE_MAX_SIZE` property and the `DBMS_AUDIT_MGMT.AUDIT_TRAIL_TYPE` type by using the `DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_PROPERTY` PL/SQL procedure. See Section 14.5.11 for more information.

Example

The following example shows how to add an OSAUD collector to Oracle Audit Vault on Linux and UNIX platforms in an Oracle Real Application Clusters (Oracle RAC) installation using the `-instname` argument.

```
$ avorcldb add_collector -srcname source1db.example.com
-agentname Agent1 -colltype OSAUD -instname av01
-orclhome /u01/app/oracle/product/10.2.0/db_1

source SOURCE1DB.EXAMPLE.COM verified for OS File Audit Collector collector
Adding collector...
Collector added successfully.
collector successfully added to Audit Vault

remember the following information for use in avctl
Collector name (collname): OSAUD_Collector
```

This example shows how to add a DBAUD collector to Audit Vault:

```
$ avorcldb add_collector -srcname source1db.example.com

-agentname Agent1 -colltype DBAUD
```

```
source SOURCE1DB.DOMAIN.COM verified for Aud$/FGA_LOG$ Audit Collector collector

Adding collector...
Collector added successfully.
collector successfully added to Audit Vault

remember the following information for use in avctl
Collector name (collname): DBAUD_Collector
```

The next example shows how to add a REDO collector to Audit Vault.

```
$ avorcldb add_collector -srcname source1db.example.com
-agentname Agent1 -colltype REDO
-av system1.example.com:1521:av

source SOURCE1DB.EXAMPLE.COM verified for REDO Log Audit Collector collector
Adding collector...
Collector added successfully.
collector successfully added to Audit Vault

remember the following information for use in avctl
Collector name (collname): REDO_Collector
initializing REDO Collector
setting up APPLY process on Audit Vault server
setting up CAPTURE process on source database
```

8.3 add_source

Registers an audit source database with Audit Vault for audit data consolidation. Run this command on the Audit Vault Server.

Syntax

```
avorcldb add_source -src host:port:service
      [-srcname srcname] [-desc desc] [-agentname agentname]
```

Arguments

Argument	Description
-src *host*:*port*:*service*	Specify the source database connection information: host name, port number, and service ID (SID), separated by a colon. If you are unsure of this connection information, check the tnsnames.ora file for the source database. To find existing databases that have already been added as sources, query the ADM_SOURCES data dictionary view. See Section 13.1.10.
-srcname *srcname*	Enter the name of the source database. Remember that the source database name is case sensitive. Optional. If you do not specify this argument, Oracle Audit Vault uses the global database name.You can check this name by selecting from the GLOBAL_NAME data dictionary view in SQL*Plus. For example: SQL> SELECT * FROM GLOBAL_NAME;
-desc *desc*	Enter a brief description of the source database. Optional.

Argument	Description
-agentname *agentname*	Create a name for a collection agent name. Optional. However, you must specify an agent name if auditors plan to configure policy management using the Audit Vault Console. To find the names of the existing agents, query the ADM_AGENTS data dictionary view. See Section 13.1.1.

Usage Notes

- The global database name of the source database is used as the source name in Oracle Audit Vault.
- The avorcldb add_source command prompts for the source user name and password. This user account must exist on the source database.

  To find this user, query the SESSION_PRIVS and SESSION_ROLES data dictionary views. The source user should have the privileges and roles that are listed in the zarsspriv.sql file, such as the CREATE DATABASE LINK privilege and DBA role.

  If the AVORCLDB_SRCUSR environment variable is set to this user account and password, then you can bypass the Enter Source user name and Enter Source password prompts. If you do specify these values, they override the environment variable.
- You must specify the -agentname *agentname* parameter so that auditors can configure policy management using the Audit Vault Console.

Example

The following example shows how to register a source with Oracle Audit Vault..

```
$ avorcldb add_source -src hrdb.example.com:1521:orcl -agentname agent1
Enter Source user name: username
Enter Source password: password

Adding source...
Source added successfully.
source successfully added to Audit Vault

remember the following information for use in avctl
Source name (srcname): RDBMSRC1.US.EXAMPLE.COM
Storing user credentials in wallet...
Create credential oracle.security.client.connect_string3
done.
Mapping Source to Agent...
```

8.4 alter_collector

Modifies the attributes of a collector. Run this command on the Audit Vault Server.

Syntax

```
avorcldb alter_collector -srcname srcname -collname collname
      [attrname=attrvalue...attrname=attrvalue]
```

Arguments

Argument	Description
`-srcname` *`srcname`*	Specify the source database (by source name) to which this collector belongs. Remember that the source database name is case sensitive. To find the associated source database names and collectors, query the `ADM_COLLECTORS` data dictionary view. See Section 13.1.3.
`-collname` *`collname`*	Specify the collector (by collector name) to be modified. The `ADM_COLLECTORS` data dictionary view lists the collector names.
`attrname=attrvalue`	Specify the pair (attribute name, new attribute value) for mutable collector attributes for this collector type. This argument is optional. Separate multiple pairs by a space on the command line.

Usage Notes

You can modify one or more collector attributes at a time. Table 8–2, Table 8–3, and Table 8–4 list the collector attributes (parameters) by collector type, whether the parameter is mutable, and its default value. See Section 3.3 for a description of these attributes.

Table 8–2 DBAUD Collector Attributes

Parameter	Description	Mutable	Default Value
`AUDAUDIT_ACTIVE_SLEEP_TIME`	The amount of active sleep time (in milliseconds) for the DBAUD process when the last retrieval actually did retrieve records.	Yes	1000 milliseconds
`AUDAUDIT_AUDIT_VAULT_ALIAS`	The alias name for the Audit Vault Server.	No	NULL
`AUDAUDIT_DELAY_TIME`	The amount of delay time (in seconds) for the DBAUD process.	Yes	20 seconds
`AUDAUDIT_MAX_PROCESS_RECORDS`	The maximum number of records after which the collector commits records to the raw audit data store and generates minor recovery context. In the case of fine-grained auditing (FGA_LOG$) and 9.X sources, the collector might need to delay this until the record with the higher timestamp is retrieved. A valid value is an integer value from 10 to 10000.	Yes	1000 records
`AUDAUDIT_SLEEP_TIME`	The amount of sleep time (in milliseconds) for the DBAUD process. For example, if it is now 10:00:00 AM, the collector will retrieve the records with the timestamps that are less than 9:59:40. However, the next time the collector will only retrieve records with the timestamps of 9:59:40 or higher. The assumption is that within 20 seconds after the timestamp is assigned to the record, the record would be visible (retrievable). This attribute is used only for time-based retrieval, which is currently used for fine-grained auditing (`FGA_LOG$`) on 9.X sources. In Audit Vault release 10.2.3, time-based retrieval is used for all retrievals.	Yes	5000 milliseconds
`AUDAUDIT_SORT_POLICY`	The audit data sort policy. This attribute is not implemented. It is deprecated for release 10.2.3.	Yes	NULL
`AUDAUDIT_SOURCE_ALIAS`	The alias name for the audit data source.	No	NULL

Table 8–3 OSAUD Collector Attributes

Parameter	Description	Mutable	Default Value
`OSAUDIT_AUDIT_VALUE_ALIAS`	The alias name for the Audit Vault Server.	No	NULL
`OSAUDIT_CHANNEL_TYPE`	The channel type being used by the collector. This attribute is not implemented. It was deprecated in Release 10.2.3.	No	NULL
`OSAUDIT_DEFAULT_FILE_DEST`[1]	The default directory for Oracle operating system audit files containing mandatory audit records.	Yes	`$ORACLE_HOME/rdbms/audit`
`OSAUDIT_FILE_DEST`	The directory where Oracle operating system audit files containing SYS and normal audit records can be found.	Yes	`$ORACLE_HOME/admin/`*`DB_UNIQUE_NAME`*`/adump`
`OSAUDIT_MAX_PROCESS_RECORDS`	The maximum number of records to be processed during each call to process the collector. A valid value is an integer value from 10 to 10000.	Yes	10000
`OSAUDIT_MAX_PROCESS_TIME`	The maximum processing time for each call to process the collector (in centiseconds). A valid value is an integer value from 10 to 10000.	Yes	600 centiseconds
`OSAUDIT_NLS_CHARSET`	The NLS character set of the data source.	Yes	WE8ISO8859P1
`OSAUDIT_NLS_LANGUAGE`	The NLS language of the data source.	Yes	AMERICAN
`OSAUDIT_NLS_TERRITORY`	The NLS territory of the data source.	Yes	AMERICA
`OSAUDIT_RAC_INSTANCE_ID`	The instance ID in the Oracle RAC environment.	Yes	1.0
`OSAUDIT_SOURCE_ALIAS`	The alias, connection string, to the source database.	Yes	NULL
`OSAUDIT_SYSLOG_FILE`	The Syslog file name and location, if other than the default as indicated in the `etc/syslog.conf` file. Setting this parameter to a valid Syslog file name will override the default setting.	Yes	NULL
`OSAUDIT_NT_ORACLE_SID`	The Oracle SID name on Windows systems.	Yes	NULL

[1] To avoid collecting duplicate operating system audit trail records, do not set the attribute value for the `OSAUDIT_DEFAULT_FILE_DEST` attribute and the `OSAUDIT_FILE_DEST` attribute such that the values although different resolves to the same directory.

Table 8–4 REDO Collector Attributes

Parameter	Description	Mutable	Default Value
AV.DATABASE.NAME	The Audit Vault database name.	No	NULL
`STRCOLL_DBPORT`	The port number of the audit data source Oracle database.	Yes	NULL
`STRCOLL_DBSERVICE`	The service name of the audit data source Oracle database.	No	NULL
`STRCOLL_HEARTBEAT_TIME`	The time, in seconds, between events for monitoring the status of the Audit Vault REDO collection system.	Yes	60 seconds
`STRCOLL_SRCADM_ALIAS`	The alias name for the audit data source.	No	NULL
`STRCOLL_SRCADM_NAME`	The name of the audit data source.	No	NULL

On Windows systems, if the path value for the `OSAUDIT_DEFAULT_FILE_DEST` attribute is set incorrectly using backslashes, use the Audit Vault Console and log in as the Audit Vault Administrator and connect as `AV_ADMIN`, click **Configuration**, click

Collector, select the **OSAUD_Collector** name, then click **Edit** and edit the value for this attribute using slashes instead of backslashes. When finished, click **OK** to save your changes.

Example

The following example shows how to alter the AUDAUDIT_DELAY_TIME attribute for the DBAUD_Collector collector in Audit Vault:

```
$ avorcldb alter_collector -srcname hrdb.example.com -collname DBAUD_Collector
AUDAUDIT_DELAY_TIME=60

Altering collector...
Collector altered successfully.
```

8.5 alter_source

Modifies the attributes of the source database. Run this command on the Audit Vault Server.

Syntax

```
avorcldb alter_source -srcname srcname
      [attrname=attrvalue...attrname=attrvalue]
```

Arguments

Argument	Description
-srcname *srcname*	Specify the source database (by source name) to be modified. Remember that the source database name is case sensitive. To find the existing source databases and their attributes, query the ADM_SOURCE_ATTRIBUTES data dictionary view. See Section 13.1.9.
attrname=attrvalue	Specify the pair (attribute name, new attribute value) for the mutable source attributes of this source to be modified. Optional. Separate multiple pairs by a space on the command line.

Usage Notes

Table 8–5 lists source attributes that you can specify for the *attrname=attrvalue* argument.

Table 8–5 Source Attributes

Parameter	Description	Mutable	Default Value
HOSTIP	The Internet protocol address of the host system on which the source database resides	Yes	NULL
VERSION	The source database version	Yes	NULL
DESCRIPTION	The description for this source database	Yes	NULL
DB_SERVICE	A new audit data source database service name	Yes	NULL

Table 8–5 (Cont.) Source Attributes

Parameter	Description	Mutable	Default Value
`PORT`	A new port number for this system where the source database audit data resides	Yes	`NULL`
`GLOBAL_DATABASE_NAME`	The new global database name	Yes	`NULL`

Example

The following example shows how to alter the `PORT` attribute for the source database named `hrdb.example.com` in Oracle Audit Vault:

```
$ avorcldb alter_source -srcname hrdb.example.com PORT=1522
Altering source...
Source altered successfully.
```

8.6 drop_collector

Drops a collector from Oracle Audit Vault. Run this command from the Audit Vault Server. The `drop_collector` command does not delete the collector from Oracle Audit Vault; instead, it disables the collector. Therefore, you can neither add a collector by the same name as the one that was dropped nor enable a collector that has been dropped.

Syntax

```
avorcldb drop_collector -srcname srcname -collname collname
```

Arguments

Argument	Description
`-srcname` *`srcname`*	Specify the name of the source database to which the collector (specified in the `-collname` argument) belongs. Remember that the source database name is case sensitive. To find the associated source database names and collectors, query the `ADM_COLLECTORS` data dictionary view. See Section 13.1.3.
`-collname` *`collname`*	Specify the collector (by collector name) to be dropped from Oracle Audit Vault. The `ADM_COLLECTORS` data dictionary view lists the collector names.

Usage Notes

The `drop_collector` command will not delete the collector from Oracle Audit Vault; it actually disables the collector. The user can neither add the same collector name again nor enable the old name.

Example

```
$ avorcldb drop_collector -srcname hrdb.example.com -collname DBAud_Collector

Dropping collector...
Collector dropped successfully.
```

8.7 drop_source

Drops a source from Oracle Audit Vault. Run this command on the Audit Vault Server.

Syntax

```
avorcldb drop_source -srcname srcname
```

Arguments

Argument	Description
`-srcname` *`srcname`*	Specify the source database (by source name) to be dropped from Oracle Audit Vault. Remember that the source database name is case sensitive. To find the existing source databases, query the `ADM_SOURCES` data dictionary view. See Section 13.1.10.

Usage Notes

- The `drop_source` command does not delete the source from Oracle Audit Vault; it disables the source. The user can neither add the same source name again nor enable the old source. Audit data from this source is no longer collected once the source has been dropped, but the information of this source is maintained in Oracle Audit Vault with a status as dropped (inactive) for future reporting purposes.
- A source cannot be dropped or deleted if there are any active collectors for this source. All collectors must be inactive (dropped) to successfully drop a source from Oracle Audit Vault.

Example

The following example shows how to drop the source named `lnxserver.domain.com` from Oracle Audit Vault:

```
$ avorcldb drop_source -srcname hrdb.example.com

Dropping source...
Source dropped successfully.
```

8.8 -help

Displays Help for the `AVORCLDB` commands. Run this command on both the Audit Vault Server and the Audit Vault collection agent.

Syntax

```
avorcldb -help

avorcldb command -help
```

Arguments

Argument	Description
`command`	The name of an `AVORCLDB` command for which you want Help to appear

Usage Notes

None

Example

The following example shows how to display general AVORCLDB utility Help in Audit Vault:

```
$ avorcldb -help
```

The following example shows how to display specific AVORCLDB Help for the add_source command in the Audit Vault Server home shell.

```
$ avorcldb add_source -help

  avorcldb add_source command

    add_source
          -src <host:port:service> [-srcusr <usr>/<pwd>]
         [-srcname <srcname>] [-desc <desc>] [-agentname <agentname>]

  Purpose: The source is added to Audit Vault. The global DB Name
       of the source database is used as the Source Name in Audit Vault.

  Arguments:
       -src        : Source DB connection information
       -srcusr     : Optional source user name and password. Will be prompted.
       -srcname    : Optional name of source, default : <global_dbname>
       -desc       : Optional description of the source
       -agentname  : Optional agent name to configure policy management

  Examples:
     avorcldb add_source -src lnxserver:4523:hrdb.domain.com
       -desc 'HR Database'
```

8.9 setup

Adds the source user credentials to the wallet, creates a database alias in the wallet for the source user, and verifies the connection to the source using the wallet. Run this command on the Audit Vault collection agent. You also can use this command to change the source user credentials in the wallet after these credentials have been changed in the source database.

Syntax

avorcldb setup -srcname *srcname*

Arguments

Argument	Description
-srcname *srcname*	Specify the name of the source database. Remember that the source database name is case sensitive. To find a list of existing source databases that have already been added to Oracle Audit Vault, query the ADM_SOURCES data dictionary view. See Section 13.1.10.

Usage Notes

- If you happen to enter an incorrect user name or password or both when issuing the setup command and receive an error message that the verification of the credentials to make the connection to the source database using the wallet was not successful, reissue the setup command again using the correct credentials.
- The `avorcldb setup` command prompts for the source user name and password. This user account must exist on the source database.

  To find this user, query the `SESSION_PRIVS` and `SESSION_ROLES` data dictionary views. The source user should have the privileges and roles that are listed in the `zarsspriv.sql` file, such as the `CREATE DATABASE LINK` privilege and `DBA` role.

  If the `AVORCLDB_SRCUSR` environment variable is set to this user account and password, then you can bypass the `Enter Source user name` and `Enter Source password` prompts. If you do specify these values, they override the environment variable.

Example

The following example configures the REDO and OSAUD collectors.

```
$ avorcldb setup -srcname hrdb.example.com
Enter Source user name: username
Enter Source password: password

adding credentials for user srcuser_ora for connection [SRCDB1]
Storing user credentials in wallet...
Create credential oracle.security.client.connect_string3
done.
updated tnsnames.ora with alias [SRCDB1] to source database
verifying SRCDB1 connection using wallet
```

To change the source user name password in the wallet in the Audit Vault collection agent home, use the following setup command, where the source name is `orcl1` and the source user name is `srcuser_ora`.

```
$ avorcldb setup -srcname orcl1
Enter Source user name: srcuser_ora
Enter Source password: password

adding credentials for user srcuser_ora for connection [SRCDB1]
Storing user credentials in wallet...
Create credential oracle.security.client.connect_string3
done.
updated tnsnames.ora with alias [SRCDB1] to source database
verifying SRCDB1 connection using wallet
```

8.10 verify

Verifies that the source is compatible for setting up the specified collectors. This command can be run on both the Audit Vault Server and the Audit Vault collection agent.

Syntax

```
avorcldb verify -src host:port:service
                -colltype [OSAUD,DBAUD,REDO,ALL]
```

Arguments

Argument	Description
`-src` *host*:*port*:*service*	Specify the source database connection information: host name, port number, and service name, separated by a colon. Typically, the host is the fully qualified domain name or IP address of the server on which the source database is running, and the port number is 1521. If you are unsure of the host and port number, check the `tnsnames.ora` file for the source database.
`-colltype` *colltype*	Specify one of the following collector types: ■ `ALL` ■ `DBAUD` ■ `OSAUD` ■ `REDO` See Table 1–4 on page 1-4 for more information about the collector types.

Usage Notes

The `avorcldb verify` command prompts for the source user name and password. This user account must exist on the source database.

To find this user, query the `SESSION_PRIVS` and `SESSION_ROLES` data dictionary views. The source user should have the privileges and roles that are listed in the `zarsspriv.sql` file, such as the `CREATE DATABASE LINK` privilege and `DBA` role.

If the `AVORCLDB_SRCUSR` environment variable is set to this user account and password, then you can bypass the `Enter Source user name` and `Enter Source password` prompts. If you do specify these values, they override the environment variable.

Example

The following example verifies that the source is compatible with the OSAUD, DBAUD, and REDO collectors on a Linux or UNIX-based system.

```
$ avorcldb verify -src hrdb.example.com:1521:orcl -colltype ALL
Enter Source user name: username
Enter Source password: password

source HRDB.EXAMPLE.COM verified for OS File Audit Collector collector
source HRDB.EXAMPLE.COM verified for Aud$/FGA_LOG$ Audit Collector collector
source HRDB.EXAMPLE.COM verified for REDO Log Audit Collector collector
```

9

Audit Vault SQL Server (AVMSSQLDB) Utility Commands

Use the Audit Vault SQL Server Database (AVMSSQLDB) command-line utility to configure Microsoft SQL Server source databases and the SQL Server collector with Oracle Audit Vault. When you run these commands, remember the following:

- **Enter the command in lower-case letters.** The commands are case sensitive.
- **When you open a shell to run the command, first set the appropriate environment variables.** See Section 2.2 for instructions.

Table 9–1 describes the AVMSSQLDB commands and where each is used, whether on the Audit Vault Server, on the Audit Vault collection agent, or in both places.

Table 9–1 AVMSSQLDB Commands

Command	Where Used?	Description
add_collector	Server	Adds a collector to Audit Vault
add_source	Server	Registers an audit source with Audit Vault
alter_collector	Server	Alters the attributes of a collector
alter_source	Server	Alters the attributes of a source
drop_collector	Server	Drops a collector from Audit Vault
drop_source	Server	Drops a source from Audit Vault
-help	Both	Displays Help for the AVMSSQLDB commands
setup	Collection Agent	Adds the source user credentials to the wallet, creates a database alias in the wallet for the source user, and verifies the connection to the source using the wallet
verify	Both	Verifies that the source is compatible with the collectors

9.1 avmssqldb

The AVMSSQLDB command-line utility.

Syntax

```
avmssqldb command -help

avmssqldb command [options] arguments
```

Arguments

Argument	Description
command	Specify one of the following commands: add_source, alter_source, drop_source, add_collector, alter_collector, drop_collector, or verify.
arguments	Specify one or more of the AVMSSQLDB command arguments.
-help	Displays Help for the AVMSSQLDB commands.

Usage Notes

Issuing an AVMSSQLDB command generates the following log file: $ORACLE_HOME/av/log/mssqldb-%g.log. The *%g* is a generation number that starts from 0 (zero) and increases once the file size reaches the 100 MB limit.

9.2 add_collector

Adds a collector for the given source to Audit Vault. Oracle Audit Vault verifies the source for requirements of the collector. Run this command on the Audit Vault Server.

Syntax

```
avmssqldb add_collector -srcname srcname -agentname agentname
        [-collname collname] [-desc desc]
```

Arguments

Argument	Description
-srcname srcname	Specify the source database name for which the collector is to be added. Remember that the source database name is case sensitive. To find a listing of of existing source database names and their associated collectors, query the ADM_COLLECTORS data dictionary view. See Section 13.1.3.
-agentname *agentname*	Create a name for the agent that will use the MSSQLDB collector. The ADM_COLLECTORS data dictionary view lists existing agent names that have been associated with source databases.
-collname *collname*	Create a name for the MSSQLDB collector. Optional. If you do not create a name, Oracle Audit Vault names the collector MSSQLCollector.
-desc *desc*	Enter a brief description of the collector. Optional.

Usage Notes

- Run any collector-specific preparation scripts before you execute the avmssqldb add_collector command.
- The avmssqldb add_collector command prompts for the source user name and password. This user account must exist on the source database. To find this user account, query the ADM_SOURCES data dictionary view, described in Section 13.1.10.

Example

The following example shows how to add the MS SQL collector to Oracle Audit Vault.

```
$ avmssqldb add_collector -srcname mssqldb4 -agentname agent1
Enter a username :source_user_name
Enter a password : password

***** Collector Added Successfully*****
```

9.3 add_source

Registers an audit source with Audit Vault for audit data consolidation. Run this command on the Audit Vault Server.

Syntax

```
avmssqldb add_source -src host:port -srcname srcname
[-desc desc]
```

Arguments

Argument	Description
`-src host:port`	Specify the source database connection information: host name and port number, separated by a colon. Typically, the host is the fully qualified domain name or IP address of the server on which the source SQL Server database is running, and the port number is 1433. To find existing databases that have already been added as sources, query the ADM_SOURCES data dictionary view. See Section 13.1.10.
`-srcname srcname`	Create a name for the source database connection.Remember that the source database name is case sensitive. Oracle Audit Vault uses this name to connect to the source Microsoft SQL Server database.
-desc *desc*	Enter a brief description for the source database. Optional.

Usage Notes

- When prompted, enter the credentials for the source user name and password. The user name specified for the source user must exist on the source database. See the example.
- The `avmssqldb add_source` command prompts for the source user name and password. This user account must exist on the source database. To find this user account, query the ADM_SOURCES data dictionary view, described in Section 13.1.10.

Example

The following example shows how to register a source with Oracle Audit Vault.

```
$ avmssqldb add_source -src mssqlerver:4523 -srcname mssqldb4 -desc 'HR Database'
Enter a username :source_user_name
Enter a password : password

***** Source Verified *****
***** Source Added Successfully *****
```

9.4 alter_collector

Modifies the attributes of a collector. Run this command on the Audit Vault Server.

Syntax

```
avmssqldb alter_collector -srcname srcname -collname collname
     [attrname=attrvalue...attrname=attrvalue]
```

Arguments

Argument	Description
`-srcname` *`srcname`*	Specify the source database (by source name) to which this collector belongs. Remember that the source database name is case sensitive. To find the associated source database names and collectors, query the `ADM_COLLECTORS` data dictionary view. See Section 13.1.3.
`-collname` *`collname`*	Specify the collector (by collector name) to be modified. The `ADM_COLLECTORS` data dictionary view lists the collector names.
`attrname=attrvalue`	Specify the pair (attribute name, new attribute value) for mutable collector property and attributes for this collector type. This argument is optional. Separate multiple pairs by a space on the command line.

Usage Notes

- You can modify the collector `DESCRIPTION` property and one or more attributes at a time. Table 9–2 lists the collector attributes (parameters), whether the parameter is mutable, the default value, and a brief description of the attribute.

Table 9–2 MSSQLDB Collector Attributes

Parameter	Mutable	Default Value	Description
`DESCRIPTION`	Yes	`NULL`	The description for this collector
`dbconnection`	No	`1`	Number of connections to the database.
`AUDIT_C2_FLAG`	Yes	`1`	Whether C2 logs can be collected by the MSSQLDB collector or not. Values can be 0 or 1.
`AUDIT_SERVERSIDE_TRACES_FLAG`	Yes	`1`	Whether server side trace logs can be collected by the MSSQLDB collector or not. Values can be 0 or 1. See the usage notes.
`AUDIT_EVENT_LOG_FLAG`	Yes	`1`	Whether events logs can be collected by the MSSQLDB collector or not. Values can be 0 or 1.
`C2_TRACE_FILEPATH`	Yes	`NULL`	The C2 trace file path. See the usage notes.

Table 9–2 (Cont.) MSSQLDB Collector Attributes

Parameter	Mutable	Default Value	Description
SERVERSIDE_TRACE_FILEPATH	Yes	NULL	The value for server-side trace file path. See the usage notes.
DELAY_TIME	Yes	20000	The delay time (in milliseconds) of the collector
NO_OF_RECORDS	Yes	1000	The maximum number of records to be fetched by the collector. This attribute is mutable.

- For SQL Server 2000 source databases only, when the AUDIT_SERVERSIDE_TRACES_FLAG attribute is set to 1 or on, the trace file (.trc) audit trail is not released to the collector until either the file reaches its maximum file size and another trace file is created, or the source database is shutdown and started up again.
- If the server side TRACEPATH parameter or the C3_TRACE_FILEPATH paramter is set to null, and the AUDIT_SERVERSIDE traces flag is set to true, then the collector queries the SQL Server database for active trace files and collects audit data from them.
- For the C2_TRACE_FILEPATH and the SERVERSIDE_TRACE_FILEPATH parameters, the value for the path can be of the form *Drive*:\Directory....\*File Prefix**.

Example

The following example shows how to alter the NO_OF_RECORDS attribute and the collector description for the MSSQLCollector collector in Audit Vault:

```
$ avmssqldb alter_collector -srcname mssqldb4 -collname MSSQLCollector NO_OF_
RECORDS=1500 DESCRIPTION="MSSQLDB collector 45" SERVER_SIDE_
FILEPATH="c:\SQLAuditFile*

***** Collector Altered Successfully *****
```

9.5 alter_source

Modifies the attributes of the source database. Run this command on the Audit Vault Server.

Syntax

```
avmssqldb alter_source -srcname sourcename
          [attrname=attrvalue...attrname=attrvalue]
```

Arguments

Argument	Description
`-srcname` *`sourcename`*	Specify the source database (by source name) to be modified. Remember that the source database name is case sensitive. To find the existing source databases and their attributes, query the `ADM_SOURCE_ATTRIBUTES` data dictionary view. See Section 13.1.9.
`attrname=attrvalue`	Specify the pair (attribute name, new attribute value) for mutable source properties and attributes for this source type. This argument is optional. Separate multiple pairs by a space on the command line.

Usage Notes

Table 9–3 lists the source attributes, a brief description of the attribute, whether the attribute is mutable, and the default value. You can modify one or more source attributes at a time.

Table 9–3 Source Attributes

Attribute	Description	Mutable	Default Value
`SOURCETYPE`	The source type name for this source database. The default name is MSSQLDB	No	`NULL`
`NAME`	The name for this source database	No	`NULL`
`HOST`	The source database host name	No	`NULL`
`HOSTIP`	The source database host IP address	No	`NULL`
`VERSION`	The source database version	Yes	`NULL`
`DESCRIPTION`	The description for this source database	Yes	`NULL`
`PORT`	A new port number for this system where the source database audit data resides	Yes	None

Example

The following example shows how to alter the `DESCRIPTION` attribute for the source database named `mssqldb4` in Oracle Audit Vault:

```
$ avmssqldb alter_source -srcname mssqldb4 DESCRIPTION="HR Database"

***** Source Altered Successfully *****
```

9.6 drop_collector

Drops a collector from Oracle Audit Vault. Run this command from the Audit Vault Server. The `drop_collector` command does not delete the collector from Oracle Audit Vault; instead, it disables the collector. Therefore, you can neither add a collector by the same name as the one that was dropped nor enable a collector that has been dropped.

Syntax

```
avmssqldb drop_collector -srcname srcname -collname collname
```

Arguments

Argument	Description
`-srcname` *`srcname`*	Specify the name of the source to which the collector (specified in the `-collname` argument) belongs. Remember that the source database name is case sensitive. To find the associated source database names and collectors, query the `ADM_COLLECTORS` data dictionary view. See Section 13.1.3.
`-collname` *`collname`*	Specify the collector (by collector name) to be dropped from Oracle Audit Vault. The `ADM_COLLECTORS` data dictionary view lists the collector names.

Usage Notes

The `drop_collector` command will not delete the collector from Oracle Audit Vault; it actually disables the collector. The user can neither add the same collector name again nor enable the old name.

Example

The following example shows how to drop the collector named `MSSQLCollector` from Oracle Audit Vault:

```
$ avmssqldb drop_collector -srcname mssqldb4 -collname MSSQLCollector

***** Collector Dropped Successfully *****
```

9.7 drop_source

Drops a source from Oracle Audit Vault. Run this command on the Audit Vault Server.

Syntax

```
avmssqldb drop_source -srcname srcname
```

Arguments

Argument	Description
`-srcname` *`srcname`*	Specify the source (by source name) to be dropped from Oracle Audit Vault. Remember that the source database name is case sensitive. To find the existing source databases, query the `ADM_SOURCES` data dictionary view. See Section 13.1.10.

Usage Notes

- The `drop_source` command does not delete the source from Oracle Audit Vault; it disables the source. The user can neither add the same source name again nor enable the old source. Audit data from this source is no longer collected once the source has been dropped, but the information of this source is maintained in Oracle Audit Vault with a status as dropped (inactive) for future reporting purposes.
- A source cannot be dropped or deleted if there are any active collectors for this source. All collectors must be inactive (dropped) to successfully drop a source from Oracle Audit Vault.

Example

The following example shows how to drop the source named mssqldb4 from Oracle Audit Vault:

```
$ avmssqldb drop_source -srcname mssqldb4

***** Drop Source Successfully *****
```

9.8 -help

Displays Help for the AVMSSQLDB commands. Run this command on both the Audit Vault Server and the Audit Vault collection agent.

Syntax

```
avmssqldb -help

avmssqldb command -help
```

Arguments

Argument	Description
command	Specify the name of an AVMSSQLDB command for which you want Help to appear.

Usage Notes

None

Example

The following example shows how to display general AVMSSQLDB utility Help in Audit Vault:

```
avmssqldb -help
```

The following example shows how to display specific AVMSSQLDB Help for the add_source command in the Audit Vault Server home shell.

```
$ avmssqldb add_source -help
  avmssqldb add_source command

    add_source
          -src <host:port>
          -srcname <srcname> [-desc <desc>]

  Purpose: The source is added to Audit Vault.

  Arguments:
       -src        : Source DB connection information to coolect audit data.
       -srcname    : Name of a source
       -desc       : Optional description of the source

  Examples:
     avmssqldb add_source -src 10.105.118.91:1433
        -desc 'source for admin databases' -srcname mssource
```

9.9 setup

Adds the source user credentials to the wallet, creates a database alias in the wallet for the source user, and verifies the connection to the source using the wallet. Run this command on the Audit Vault collection agent. You also can use this command to change the source user credentials in the wallet after these credentials have been changed in the source database.

Syntax

```
avmssqldb setup -srcname srcname
```

Arguments

Argument	Description
`-srcname` *`srcname`*	Specify the name of the source database. Remember that the source database name is case sensitive. To find a list of existing source databases that have already been added to Oracle Audit Vault, query the `ADM_SOURCES` data dictionary view. See Section 13.1.10.

Usage Notes

- The `avmssqldb setup` command prompts for the source user name and password. This user account must exist on the source database. To find this user account, query the `ADM_SOURCES` data dictionary view, described in Section 13.1.10.
- The credentials of the source user are added to the wallet.
- If you happen to enter an incorrect user name or password or both when issuing the setup command and receive an error message that the verification of the credentials to make the connection to the source database using the wallet was not successful, reissue the `setup` command again using the correct credentials.

Example

```
$ avmssqldb setup -srcname mssqldb4
Enter a username : source_user_name
Enter a password : password

***** Credentials Successfully added *****
```

9.10 verify

Verifies that the source is compatible for setting up the specified collector. This command can be run on both the Audit Vault Server and the Audit Vault collection agent.

Syntax

```
avmssqldb verify -src host:port
```

Arguments

Argument	Description
`-src` *host*`:`*port*	Specify the source database connection information: host name and port number, separated by a colon. Typically, the host is the fully qualified domain name or IP address of the server on which the source SQL Server database is running, and the port number is 1433.

Usage Notes

- The `avmssqldb verify` command prompts for the source user name and password. This user account must exist on the source database. To find this user account, query the `ADM_SOURCES` data dictionary view, described in Section 13.1.10.
- The `verify` command checks the following:
  - Whether the version of the database is supported: SQL Server 2000 or SQL Server 2005
  - Whether the source user has the required privileges in the source database that is to be registered with Audit Vault
  - Whether auditing (C2 auditing and server-side trace auditing) is enabled or not in the source database

Example

The following example verifies that the source is compatible with the MSSQLDB, collector on Windows.

```
$ avmssqldb verify -src 192.0.2.1:4523
Enter a username : source_user_name
Enter a password : password

***** Source Verified *****
```

10 Audit Vault Sybase ASE (AVSYBDB) Utility Commands

Use the Audit Vault Sybase Database (AVSYBDB) command-line utility to configure Sybase ASE audit source databases and the Sybase collector with Oracle Audit Vault. When you run these commands, remember the following:

- **Enter the command in lower-case letters.** The commands are case sensitive.
- **When you open a shell to run the command, first set the appropriate environment variables.** See Section 2.2 for instructions.

Table 10–1 describes the AVSYBDB commands and where each is used, whether on the Audit Vault Server, on the Audit Vault collection agent, or in both places.

Table 10–1 AVSYBDB Commands

Command	Where Used?	Description
add_collector	Server	Adds a collector to Audit Vault
add_source	Server	Registers an audit source with Audit Vault
alter_collector	Server	Alters the attributes of a collector
alter_source	Server	Alters the attributes of a source
drop_collector	Server	Drops a collector from Audit Vault
drop_source	Server	Drops a source from Audit Vault
-help	Both	Displays Help for the AVSYBDB commands
setup	Collection Agent	Adds the source user credentials to the wallet, creates a database alias in the wallet for the source user, and verifies the connection to the source using the wallet
verify	Both	Verifies that the source is compatible with the collectors

10.1 avsybdb

The AVSYBDB command-line utility.

Syntax

```
avsybdb command -help

avsybdb command [options] arguments
```

Arguments

Argument	Description
command	Specify one of the following commands: add_source, alter_source, drop_source, add_collector, alter_collector, drop_collector, setup or verify.
arguments	Specify one or more of the AVSYBDB command arguments.
-help	Displays Help for the AVSYBDB commands.

Usage Notes

Issuing an AVSYBDB command generates the following log file: $ORACLE_HOME/av/log/sybdb-%g.log. The *%g* is a generation number that starts from 0 (zero) and increases once the file size reaches the 100 MB limit.

10.2 add_collector

Adds a collector for the given source to Audit Vault. The source is verified for requirements of the collector. Run this command on the Audit Vault Server.

Syntax

```
avsybdb add_collector -srcname srcname -agentname agentname
        [-collname collname] [-desc desc]
```

Arguments

Argument	Description
-srcname *srcname*	Specify the source database name for which the collector is to be added. Remember that the source database name is case sensitive. Typically, the host is the fully qualified domain name or IP address of the server on which the source Sybase ASE database is running, and the port number is 5000. To find a listing of of existing source database names and their associated collectors, query the ADM_COLLECTORS data dictionary view. See Section 13.1.3.
-agentname *agentname*	Create a name for the agent that will use the SYBDB collector. The ADM_COLLECTORS data dictionary view lists existing agent names.
-collname *collname*	Create a name for the SYBDB collector. Optional. If you do not create a name, Oracle Audit Vault names the collector SybaseCollector.
-desc *desc*	Enter a brief description of the collector. Optional.

Usage Notes

- Run any collector-specific preparation scripts before you execute the avsybdb add_collector command.
- The avsybdb add_collector command prompts for the source user name and password. This user account must exist on the source database. To find this user

account, query the ADM_SOURCES data dictionary view, described in Section 13.1.10.

Example

The following example shows how to add an SYBDB collector to Oracle Audit Vault on Linux and UNIX platforms.

```
$ avsybdb add_collector -srcname sybdb4 -agentname agent1
Enter a username : source_user_name
Enter a password : password

***** Collector Added Successfully*****
```

10.3 add_source

Registers an audit source with Audit Vault for audit data consolidation. Run this command on the Audit Vault Server.

Syntax

```
avsybdb add_source -src host:port -srcname srcname [-desc desc]
```

Arguments

Argument	Description
-src *host*:*port*	Specify the source database connection information: host name and port number, separated by a colon. Typically, the host is the fully qualified domain name or IP address of the server on which the source Sybase ASE database is running, and the port number is 5000. To find existing databases that have already been added as sources, query the ADM_SOURCES data dictionary view. See Section 13.1.10.
-srcname *srcname*	Create a name to associate with this source database. Remember that the source database name is case sensitive. Oracle Audit Vault uses this name to connect to the source Sybase ASE database.
-desc *desc*	Enter a brief description of the source database. Optional.

Usage Notes

The avsybdb add_source command prompts for the source user name and password. This user account must exist on the source database. To find this user account, query the ADM_SOURCES data dictionary view, described in Section 13.1.10.

Example

The following example shows how to register a source with Oracle Audit Vault.

```
$ avsybdb add_source -src lnxserver:4523 -srcname sybdb4 -desc 'HR Database'
Enter a username : source_user_name
Enter a password : password

***** Source Verified *****
***** Source Added Successfully *****
```

10.4 alter_collector

Modifies the attributes of a collector. Run this command on the Audit Vault Server.

Syntax

```
avsybdb alter_collector -srcname srcname -collname collname
       [attrname=attrvalue...attrname=attrvalue]
```

Arguments

Argument	Description
-srcname *srcname*	Specify the source database (by source name) to which this collector belongs. Remember that the source database name is case sensitive. To find the associated source database names and collectors, query the ADM_COLLECTORS data dictionary view. See Section 13.1.3.
-collname *collname*	Specify the collector (by collector name) to be modified. The ADM_COLLECTORS data dictionary view lists the collector names.
attrname=attrvalue	Specify the pair (attribute name, new attribute value) for mutable collector property and attributes for this collector type. This argument is optional. Separate multiple pairs by a space on the command line.

Usage Notes

You can modify one or more collector attributes at a time. Table 10–2 lists the collector attributes (parameters), whether the parameter is mutable, and its default value, and a brief description.

Table 10–2 SYBDB Collector Attributes

Parameter	Mutable	Default Value	Description
DESCRIPTION	Yes	NULL	The description for this collector
dbconnection	No	1	Number of connections to the database.
DELAY_TIME	Yes	20000	The delay time (in milliseconds) of the collector.
NO_OF_RECORDS	Yes	1000	The maximum number of records to be fetched by the collector.

Example

The following example shows how to alter the NO_OF_RECORDS attribute and the collector description for the SybaseCollector collector in Audit Vault:

```
$ avsybdb alter_collector -srcname sybdb4 -collname SybaseCollector
NO_OF_RECORDS=1500 DESCRIPTION="Sybase collector 45"

***** Collector Altered Successfully *****
```

10.5 alter_source

Modifies the attributes of the source database. Run this command on the Audit Vault Server

Syntax

```
avsybdb alter_source -srcname srcname
      [attrname=attrvalue...attrname=attrvalue]
```

Arguments

Argument	Description
-srcname *srcname*	Specify the source database (by source name) to be modified. Remember that the source database name is case sensitive. To find the existing source databases and their attributes, query the ADM_SOURCE_ATTRIBUTES data dictionary view. See Section 13.1.9.
attrname=attrvalue	Specify the pair (attribute name, new attribute value) for mutable source properties and attributes for this source type. This argument is optional. Separate multiple pairs by a space on the command line. See Table 10–3 for more information.

Usage Notes

Table 10–3 lists the source database attributes, a brief description of the attribute, whether the attribute is mutable, and the default value. You can modify one or more source attributes at a time.

Table 10–3 Source Attributes

Attribute	Description	Mutable	Default Value
SOURCETYPE	The source type name for this source database. The default name is SYBDB.	No	NULL
NAME	The name for this source database.	No	NULL
HOST	The source database host name.	No	NULL
HOSTIP	The source database host IP address.	No	NULL
VERSION	The source database version.	Yes	NULL
DESCRIPTION	A new description for this source database.	Yes	NULL
PORT	A new port number for this system where the source database audit data resides	Yes	None

Example

The following example shows how to alter the DESCRIPTION attribute for the source database named sybdb4 in Oracle Audit Vault:

```
$ avsybdb alter_source -srcname sybdb4 DESCRIPTION="HR Database"

***** Source Altered Successfully *****
```

10.6 drop_collector

Drops a collector from Oracle Audit Vault. Run this command from the Audit Vault Server. The drop_collector command does not delete the collector from Oracle Audit Vault; instead, it disables the collector. Therefore, you can neither add a collector by the same name as the one that was dropped nor enable a collector that has been dropped.

Syntax

```
avsybdb drop_collector -srcname srcname -collname collname
```

Arguments

Argument	Description
`-srcname` *srcname*	Specify the name of the source database to which the collector (specified in the `-collname` argument) belongs. Remember that the source database name is case sensitive. To find the associated source database names and collectors, query the `ADM_COLLECTORS` data dictionary view. See Section 13.1.3.
`-collname` *collname*	Specify the collector (by collector name) to be dropped from Oracle Audit Vault. The `ADM_COLLECTORS` data dictionary view lists the collector names.

Usage Notes

The `drop_collector` command will not delete the collector from Oracle Audit Vault; it actually disables the collector. The user can neither add the same collector name again nor enable the old name.

Example

The following example shows how to drop the collector named 'SybaseCollector' from Oracle Audit Vault:

```
$ avsybdb drop_collector -srcname sybdb4 -collname SybaseCollector

***** Collector Dropped Successfully *****
```

10.7 drop_source

Drops a source from Oracle Audit Vault. Run this command on the Audit Vault Server.

Syntax

```
avsybdb drop_source -srcname srcname
```

Arguments

Argument	Description
`-srcname` *srcname*	Specify the source database (by source name) to be dropped from Oracle Audit Vault. Remember that the source database name is case sensitive. To find the existing source databases, query the `ADM_SOURCES` data dictionary view. See Section 13.1.10.

Usage Notes

- The `drop_source` command does not delete the source database from Oracle Audit Vault; it disables the source. The user can neither add the same source name again nor enable the old source. Audit data from this source is no longer collected once the source has been dropped, but the information of this source is maintained in Oracle Audit Vault with a status as dropped (inactive) for future reporting purposes.

- You cannot drop or delete a source database if there are any active collectors for this source. All collectors must be inactive (dropped) to successfully drop a source from Oracle Audit Vault.

Example

The following example shows how to drop the source named `sybdb4` from Oracle Audit Vault:

```
$ avsybdb drop_source -srcname sybdb4

***** Drop Source Successfully *****
```

10.8 -help

Displays Help for the `AVSYBDB` commands. Run this command on both the Audit Vault Server and the Audit Vault collection agent.

Syntax

```
avsybdb -help

avsybdb command -help
```

Arguments

Argument	Description
command	Enter the name of an `AVSYBDB` command for which you want Help to appear.

Usage Notes

None

Example

The following example shows how to display general `AVSYBDB` utility Help in Audit Vault:

```
avsybdb -help
```

The following example shows how to display specific `AVSYBDB` Help for the `add_source` command in the Audit Vault Server home shell.

```
$ avsybdb add_source -help
  avsybdb add_source command

    add_source
          -src <host:port> -srcname <srcname>
          [-desc <desc>]

  Purpose: The source is added to Audit Vault.

  Arguments:
       -src        : Source DB connection information
       -srcname    : Name of a source
       -desc       : Optional description of the source

  Examples:
     avsybdb add_source -src lnxserver:4523
        -desc 'HR Database'
```

10.9 setup

Adds the source user credentials to the wallet, creates a database alias in the wallet for the source user, and verifies the connection to the source using the wallet. Run this command on the Audit Vault collection agent. You also can use this command to change the source user credentials in the wallet after these credentials have been changed in the source database.

Syntax

```
avsybdb setup -srcname srcname
```

Arguments

Argument	Description
`-srcname` *`srcname`*	Enter the name of the source database. Remember that the source database name is case sensitive. To find a list of existing source databases that have already been added to Oracle Audit Vault, query the `ADM_SOURCES` data dictionary view. See Section 13.1.10.

Usage Notes

- The `avsybdb setup` command prompts for the source user name and password. This user account must exist on the source database. To find this user account, query the `ADM_SOURCES` data dictionary view, described in Section 13.1.10.
- The credentials of the source user are added to the wallet.
- If you happen to enter an incorrect user name or password or both when issuing the setup command and receive an error message that the verification of the credentials to make the connection to the source database using the wallet was not successful, reissue the setup command again using the correct credentials.

Example

```
$ avsybdb setup -srcname sybdb4
Enter a username : source_user_name
Enter a password : password

***** Credentials Successfully added *****
```

10.10 verify

Verifies that the source is compatible for setting up the specified collectors. This command can be run on both the Audit Vault Server and the Audit Vault collection agent.

Syntax

```
avsybdb verify -src host:port
```

Arguments

Argument	Description
`-src` *`host`*`:`*`port`*	Specify the source database connection information: host name and port number, separated by a colon. Typically, the host is the fully qualified domain name or IP address of the server on which the source Sybase ASE database is running, and the port number is 5000.

Usage Notes

- The `avsybdb verify` command prompts for the source user name and password. This user account must exist on the source database. To find this user account, query the `ADM_SOURCES` data dictionary view, described in Section 13.1.10.
- The `verify` command checks the following:
  - Whether the version of the database is supported: Sybase ASE 15.0.2 or Sybase ASE 12.5.4
  - Whether the source user has the required privileges in the source database that is to be registered with Audit Vault
  - Whether auditing is enabled or not in the source database
  - Whether the operating system on which the source database is running is supported or not

Example

The following example verifies that the source is compatible with the SYBDB collector on a Linux or UNIX-based system.

```
$ avsybdb verify -src 192.0.2.7:5000
Enter a username : source_user_name
Enter a password : password

***** Source Verified *****
```

11

Audit Vault IBM DB2 (AVDB2DB) Utility Commands

Use the Audit Vault Sybase Database (AVDB2DB) command-line utility to configure IBM DB2 source databases and the IBM DB2 DB2DB collector with Oracle Audit Vault. When you run these commands, remember the following:

- **Enter the command in lower-case letters.** The commands are case sensitive.
- **When you open a shell to run the command, first set the appropriate environment variables.** See Section 2.2 for instructions.

Table 11–1 describes the AVDB2DB commands and where each is used, whether on the Audit Vault Server, on the Audit Vault collection agent, or in both places.

Table 11–1 AVDB2DB Commands

Command	Where Used?	Description
add_collector	Server	Adds a collector to Audit Vault
add_source	Server	Registers an audit source with Audit Vault
alter_collector	Server	Alters the attributes of a collector
alter_source	Server	Alters the attributes of a source
drop_collector	Server	Drops a collector from Audit Vault
drop_source	Server	Drops a source from Audit Vault
-help	Both	Displays Help for the AVDB2DB commands
setup	Collection Agent	Adds the source user credentials to the wallet, creates a database alias in the wallet for the source user, and verifies the connection to the source using the wallet
verify	Both	Verifies that the source is compatible with the collectors

11.1 avdb2db

The AVDB2DB command-line utility.

Syntax

```
avdb2db command -help

avdb2db command [options] arguments
```

Arguments

Argument	Description
command	Specify one of the following commands: `add_source`, `alter_source`, `drop_source`, `add_collector`, `alter_collector`, `drop_collector`, `setup` or `verify`.
arguments	Specify one or more of the `AVDB2DB` command arguments.
`-help`	Displays Help for the `AVDB2DB` commands.

Usage Notes

Issuing an `AVDB2DB` command generates the following log file: `$ORACLE_HOME/av/log/db2db-%g.log`. The *%g* is a generation number that starts from 0 (zero) and increases once the file size reaches the 100 MB limit.

11.2 add_collector

Adds a collector for the given source to Audit Vault. The source is verified for requirements of the collector. Run this command on the Audit Vault Server.

Syntax

```
avdb2db add_collector -srcname srcname -agentname agentname
        [-collname collname] [-desc desc]
```

Arguments

Argument	Description
`-srcname` *srcname*	Specify the source database name for which the collector is to be added. Remember that the source database name is case sensitive. Typically, the host is the fully qualified domain name or IP address of the server on which the source IBM DB2 database is running, and the port number is 50000. To find a listing of existing source database names and their associated collectors, query the `ADM_COLLECTORS` data dictionary view. See Section 13.1.3.
`-agentname` *agentname*	Create a name for the agent that will use the DB2DB collector. The `ADM_COLLECTORS` data dictionary view lists existing agent names.
`-collname` *collname*	Create a name for the DB2DB collector. Optional. If you do not create a name, Oracle Audit Vault names the collector `DB2_Coll`.
`-desc` *desc*	Enter a brief description of the collector. Optional.

Usage Notes

- Run any collector-specific preparation scripts before you execute the `avdb2db add_collector` command.
- The `avdb2db add_collector` command prompts for a user name and password. This user account must have privileges to run the IBM DB2 `db2audit` command (for example, a user who has the `sysadmin` privilege).

Example

The following example shows how to add an DB2DB collector to Oracle Audit Vault on Linux and UNIX platforms.

```
$ avdb2db add_collector -srcname db2db4 -agentname agent1
Enter a username : source_user_name
Enter a password : password

***** Collector Added Successfully*****
```

11.3 add_source

Registers an audit source with Audit Vault for audit data consolidation. Run this command on the Audit Vault Server.

Syntax

```
avdb2db add_source -src host:port -srcname srcname [-desc desc]
```

Arguments

Argument	Description
-src *host*:*port*	Specify the source database connection information: host name and port number, separated by a colon. Remember that the source database name is case sensitive. Typically, the host is the fully qualified domain name or IP address of the server on which the source IBM DB2 database is running, and the port number is 50000. To find existing databases that have already been added as sources, query the `ADM_SOURCES` data dictionary view. See Section 13.1.10.
-srcname *srcname*	Create a name to associate with this source database. Oracle Audit Vault uses this name to connect to the source IBM DB2 database.
-desc *desc*	Enter a brief description of the source database. Optional.

Usage Notes

The `avdb2db add_source` command prompts for a user name and password. This user account must have privileges to run the IBM DB2 `db2audit` command (for example, a user who has the `sysadmin` privilege).

Example

The following example shows how to register a source with Oracle Audit Vault.

```
$ avdb2db add_source -src lnxserver:4523 -srcname db2db4 -desc 'HR Database'
Enter a username : source_user_name
Enter a password : password

***** Source Verified *****
***** Source Added Successfully *****
```

11.4 alter_collector

Modifies the attributes of a collector. Run this command on the Audit Vault Server.

Syntax

```
avdb2db alter_collector -srcname srcname -collname collname
      [attrname=attrvalue...attrname=attrvalue]
```

Arguments

Argument	Description
-srcname *srcname*	Specify the source database (by source name) to which this collector belongs. Remember that the source database name is case sensitive. To find the associated source database names and collectors, query the ADM_COLLECTORS data dictionary view. See Section 13.1.3.
-collname *collname*	Specify the collector (by collector name) to be modified. The ADM_COLLECTORS data dictionary view lists the collector names.
attrname=attrvalue	Specify the pair (attribute name, new attribute value) for mutable collector property and attributes for this collector type. This argument is optional. Separate multiple pairs by a space on the command line.

Usage Notes

You can modify one or more collector attributes at a time. Table 11–2 lists the collector attributes (parameters), whether the parameter is mutable, and its default value, and a brief description.

Table 11–2 DB2DB Collector Attributes

Parameter	Mutable	Default Value	Description
DESCRIPTION	Yes	NULL	The description for this collector
dbconnection	No	1	Number of connections to the database.
DELAY_TIME	Yes	20000	The delay time (in milliseconds) of the collector.
NO_OF_RECORDS	Yes	1000	The maximum number of records to be fetched by the collector.
SINGLE_FILEPATH	Yes	NULL	The location of the directory where the DB2 collector will look for files to collect audit records from or the location to which the DB2 extraction utility writes the text files.

Example

The following example shows how to alter the NO_OF_RECORDS attribute and the collector description for the DB2Collector collector in Audit Vault:

```
$ avdb2db alter_collector -srcname db2db4 -collname DB2Collector
NO_OF_RECORDS=1500 DESCRIPTION="IBM DB2 collector 9"

***** Collector Altered Successfully *****
```

11.5 alter_source

Modifies the attributes of the source database. Run this command on the Audit Vault Server

Syntax

```
avdb2db alter_source -srcname srcname
     [attrname=attrvalue...attrname=attrvalue]
```

Arguments

Argument	Description
`-srcname` *srcname*	Specify the source database (by source name) to be modified. Remember that the source database name is case sensitive. To find the existing source databases and their attributes, query the `ADM_SOURCE_ATTRIBUTES` data dictionary view. See Section 13.1.9.
attrname=attrvalue	Specify the pair (attribute name, new attribute value) for mutable source properties and attributes for this source type. This argument is optional. Separate multiple pairs by a space on the command line. See Table 11–3 for more information.

Usage Notes

Table 11–3 lists the source database attributes, a brief description of the attribute, whether the attribute is mutable, and the default value. You can modify one or more source attributes at a time.

Table 11–3 Source Attributes

Attribute	Description	Mutable	Default Value
`SOURCETYPE`	The source type name for this source database. The default name is DB2DB.	No	`NULL`
`NAME`	The name for this source database.	No	`NULL`
`HOST`	The source database host name.	No	`NULL`
`HOSTIP`	The source database host IP address.	No	`NULL`
`VERSION`	The source database version.	Yes	`NULL`
`DESCRIPTION`	A new description for this source database.	Yes	`NULL`
`PORT`	A new port number for this system where the source database audit data resides	Yes	None

Example

The following example shows how to alter the `DESCRIPTION` attribute for the source database named `db2db4` in Oracle Audit Vault:

```
$ avdb2db alter_source -srcname db2db4 DESCRIPTION="HR Database"

***** Source Altered Successfully *****
```

11.6 drop_collector

Drops a collector from Oracle Audit Vault. Run this command from the Audit Vault Server. The `drop_collector` command does not delete the collector from Oracle Audit Vault; instead, it disables the collector. Therefore, you can neither add a collector by the same name as the one that was dropped nor enable a collector that has been dropped.

Syntax

```
avdb2db drop_collector -srcname srcname -collname collname
```

Arguments

Argument	Description
`-srcname` *srcname*	Specify the name of the source database to which the collector (specified in the `-collname` argument) belongs. Remember that the source database name is case sensitive. To find the associated source database names and collectors, query the `ADM_COLLECTORS` data dictionary view. See Section 13.1.3.
`-collname` *collname*	Specify the collector (by collector name) to be dropped from Oracle Audit Vault. The `ADM_COLLECTORS` data dictionary view lists the collector names.

Usage Notes

The `drop_collector` command will not delete the collector from Oracle Audit Vault; it actually disables the collector. The user can neither add the same collector name again nor enable the old name.

Example

The following example shows how to drop the collector named 'DB2Collector' from Oracle Audit Vault:

```
$ avdb2db drop_collector -srcname db2db4 -collname DB2Collector

***** Collector Dropped Successfully *****
```

11.7 drop_source

Drops a source from Oracle Audit Vault. Run this command on the Audit Vault Server.

Syntax

```
avdb2db drop_source -srcname srcname
```

Arguments

Argument	Description
`-srcname` *srcname*	Specify the source database (by source name) to be dropped from Oracle Audit Vault. Remember that the source database name is case sensitive. To find the existing source databases, query the `ADM_SOURCES` data dictionary view. See Section 13.1.10.

Usage Notes

- The `drop_source` command does not delete the source database from Oracle Audit Vault; it disables the source. The user can neither add the same source name again nor enable the old source. Audit data from this source is no longer collected once the source has been dropped, but the information of this source is maintained in Oracle Audit Vault with a status as dropped (inactive) for future reporting purposes.

- You cannot drop or delete a source database if there are any active collectors for this source. All collectors must be inactive (dropped) to successfully drop a source from Oracle Audit Vault.

Example

The following example shows how to drop the source named `db2db4` from Oracle Audit Vault:

```
$ avdb2db drop_source -srcname db2db4

***** Drop Source Successfully *****
```

11.8 -help

Displays Help for the `AVDB2DB` commands. Run this command on both the Audit Vault Server and the Audit Vault collection agent.

Syntax

```
avdb2db -help

avdb2db command -help
```

Arguments

Argument	Description
command	Enter the name of an `AVDB2DB` command for which you want Help to appear.

Usage Notes

None

Example

The following example shows how to display general `AVDB2DB` utility Help in Audit Vault:

```
avdb2db -help
```

The following example shows how to display specific `AVDB2DB` Help for the `add_source` command in the Audit Vault Server home shell.

```
$ avdb2db add_source -help
  avdb2db add_source command

    add_source
          -src <host:port> -srcname <srcname>
          [-desc <desc>]

  Purpose: The source is added to Audit Vault.

  Arguments:
       -src        : Source DB connection information
       -srcname    : Name of a source
```

```
      -desc       : Optional description of the source

  Examples:
     avdb2db add_source -src lnxserver:4523
        -desc 'HR Database'
```

11.9 setup

Adds the source user credentials to the wallet, creates a database alias in the wallet for the source user, and verifies the connection to the source using the wallet. Run this command on the Audit Vault collection agent. You also can use this command to change the source user credentials in the wallet after these credentials have been changed in the source database.

Syntax

```
avdb2db setup -srcname srcname
```

Arguments

Argument	Description
`-srcname` *`srcname`*	Enter the name of the source database. Remember that the source database name is case sensitive. To find a list of existing source databases that have already been added to Oracle Audit Vault, query the `ADM_SOURCES` data dictionary view. See Section 13.1.10.

Usage Notes

- The `avdb2db setup` command prompts for a user name and password. This user account must have privileges to run the IBM DB2 `db2audit` command (for example, a user who has the `sysadmin` privilege).
- The credentials of the source user are added to the wallet.
- If you happen to enter an incorrect user name or password or both when issuing the setup command and receive an error message that the verification of the credentials to make the connection to the source database using the wallet was not successful, reissue the setup command again using the correct credentials.

Example

```
$ avdb2db setup -srcname db2db4
Enter a username : source_user_name
Enter a password : password

***** Credentials Successfully added *****
```

11.10 verify

Verifies that the source is compatible for setting up the specified collectors. This command can be run on both the Audit Vault Server and the Audit Vault collection agent.

Syntax

```
avdb2db verify -src host:port:/database_name
```

Arguments

Argument	Description
`-src` *`host`*`:`*`port`*`:/`*`database_name`*	Specify the source database connection information: host name and port number, separated by a colon. Typically, the host is the fully qualified domain name or IP address of the server on which the source IBM DB2 database is running, and the port number is 50000.

Usage Notes

- The `avdb2db setup` command prompts for a user name and password. This user account must have privileges to run the IBM DB2 `db2audit` command (for example, a user who has the `sysadmin` privilege).
- The `verify` command checks the following:
  - Whether the version of the database is supported: Version 8.2 or 9.5.
  - Whether the source user has the required privileges in the source database that is to be registered with Audit Vault
  - Whether auditing is enabled or not in the source database
  - Whether the operating system on which the source database is running is supported or not

Example

The following example verifies that the source is compatible with the DB2DB collector on a Linux or UNIX-based system.

```
$ avdb2db verify -src 192.0.2.7:50000:sales_db
Enter a username : source_user_name
Enter a password : password

***** Source Verified *****
```

12 REDO Collector Database Reference

This chapter describes recommendations for setting initialization parameters for participating source sites for Oracle Database audit sources for the following releases: Oracle9*i* Database release 2 (9.2), Oracle Database 10*g* release 1 (10.1), Oracle Database 10*g* release 2 (10.2), and Oracle Database 11*g* release 1 (11.1). It is divided into the following sections:

- Oracle9i Database Release 2 (9.2) Audit Source Parameter Recommendations
- Oracle Database 10g Release 1 (10.1) Audit Source Parameter Recommendations
- Oracle Database 10g Release 2 (10.2) Audit Source Parameter Recommendations
- Oracle Database 11g Release 1 (11.1) Audit Source Parameter Recommendations

After changing these initialization parameters described in these sections, the DBA must restart the source database before an Oracle Redo Log Collector is set up to collect audit data.

12.1 Oracle9*i* Database Release 2 (9.2) Audit Source Parameter Recommendations

At each participating source site, configure the initialization parameters for each database to include the following hidden parameters (see Table 12–1).

Table 12–1 Hidden Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
`_first_spare_parameter=200M/(current _shared_pool_size+200M)`	Mandatory	10	The threshold (percent) of shared_pool_size memory at which spillover to disk is triggered for captured messages
`_kghdsidx_count=1`	Recommended	Range: 10 to 80	This parameter prevents the shared_pool from being divided among cpus.
`_job_queue_interval=1`	Recommended	5	Scan rate interval (seconds) of job queue
`_spin_count=5000`	Recommended	2000	See the *Oracle Magazine* Tuning article from March 2003 for a discussion of this parameter. Set this parameter if Memory Queue and Memory Queue Subscriber latch sleeps are high.

At each participating source site, confirm that the following required initialization parameters are set appropriately for each database (see Table 12–2). The SHARED_ POOL_SIZE parameter is of particular importance for REDO collectors.

Table 12–2 Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
`AQ_TM_PROCESSES=4`	Mandatory	Default: `0` Range: 0 to 10	Establishes queue monitor processes. Setting the parameter to 1 or more starts the specified number of queue monitor processes. These queue monitor processes are responsible for managing time-based operations of messages such as delay and expiration, cleaning up retained messages after the specified retention time, and cleaning up consumed messages if the retention time is zero. This parameter is required for both Streams captured messages and user-enqueued messages.
`COMPATIBLE=9.2.0`	Mandatory	Default: 8.1.0 Range: 8.1.0 to Current Release Number	This parameter specifies the release with which the Oracle server must maintain compatibility. Oracle servers with different compatibility levels can interoperate. To use Streams, this parameter must be set to `9.2.0` or higher.
`GLOBAL_NAMES=true`	Recommended	Default: `false` Range: `true` or `false`	Specifies whether a database link is required to have the same name as the database to which it connects. If you want to use Streams to share information between databases, then set this parameter to true at each database that is participating in your Streams environment.
`JOB_QUEUE_PROCESSES=4`	Mandatory	Default: 0 Range: 0 to 1000	Specifies the number of Jnnn job queue processes for each instance (J000 ... J999). Job queue processes handle requests created by `DBMS_JOB`. You can change the setting for `JOB_QUEUE_PROCESSES` dynamically by using the `ALTER SYSTEM` statement. This parameter must be set to at least 2 at each database that is propagating events in your Streams environment, and should be set to the same value as the maximum number of jobs that can run simultaneously plus two.
`LOG_PALALLELISM=1` This parameter has to be set to 1. Note that the default value is 1.	Mandatory	Default: 1 Range: 1 to 255	Specifies the level of concurrency for redo allocation within Oracle. If you plan to run one or more capture processes on a database, then this parameter must be set to 1. Setting this parameter to 1 does not affect the parallelism of capture. You can set parallelism for a capture process using the `SET_PARAMETER` procedure in the `DBMS_CAPTURE_ADM` package.
`LOGMNR_MAX_PERSISTENT_SESSIONS=3` This parameter must be set to at least 1 which is also the default value.	Mandatory	Default: 1 Range: 1 to `LICENSE_MAX_SESSIONS`	Specifies the maximum number of persistent LogMiner mining sessions that are concurrently active when all sessions are mining redo logs generated by instances. If you plan to run multiple Streams capture processes on a single database, then set this parameter equal to or higher than the number of planned capture processes.
`OPEN_LINKS=4`	Recommended	Default: 4 Range: 0 to 255	Specifies the maximum number of concurrent open connections to remote databases in one session. These connections include database links, as well as external procedures and cartridges, each of which uses a separate process. In a Streams environment, ensure that this parameter is set to the default value of 4 or higher.

Table 12–2 (Cont.) Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
PARALLEL_MAX_SERVERS=20	Mandatory	Default: Derived from the values of the following parameters: CPU_COUNT PARALLEL_ADAPTIVE_MULTI_USER PARALLEL_AUTOMATIC_TUNING Range: 0 to 3599	Specifies the maximum number of parallel execution processes and parallel recovery processes for an instance. As demand increases, Oracle will increase the number of processes from the number created at instance startup up to this value. In a Streams environment, each capture process and apply process can use multiple parallel execution servers. Set this initialization parameter to an appropriate value to ensure that there are enough parallel execution servers.
PROCESSES	Recommended	Default: Derived from PARALLEL_MAX_SERVERS Range: 6 to operating system dependent limit	Specifies the maximum number of operating system user processes that can simultaneously connect to Oracle. Ensure that the value of this parameter allows for all background processes, such as locks, job queue processes, and parallel execution processes. In Streams, capture processes and apply processes use background processes and parallel execution processes, and propagation jobs use job queue processes.
SESSIONS	Recommended	Default: Derived from: (1.1 * PROCESSES) + 5 Range: 1 to 231	Specifies the maximum number of sessions that can be created in the system. If you plan to run one or more capture processes or apply processes in a database, then you may need to increase the size of this parameter. Each background process in a database requires a session.
SGA_MAX_SIZE Increase by at least 200M	Mandatory	Default: Initial size of SGA at startup Range: 0 to operating system dependent limit	Specifies the maximum size of SGA for the lifetime of a database instance. If you plan to run multiple capture processes on a single database, then you may need to increase the size of this parameter.

Table 12–2 (Cont.) Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
SHARED_POOL_SIZE= (Increase by at least 200M)	Mandatory	Default: 32-bit platforms: 8 MB, rounded up to the nearest granule size 64-bit platforms: 64 MB, rounded up to the nearest granule size Range: Minimum: the granule size Maximum: operating system-dependent	Specifies (in bytes) the size of the shared pool. The shared pool contains shared cursors, stored procedures, control structures, and other structures. You should increase the size of the shared pool by 10 MB for each capture process on a database. Additional memory is required from the shared_pool for storing logical change records (LCRs) in the buffer queue. This parameter should be sized so that LCRs remain in memory as much as possible. Use the formula shared_pool_size*_first_spare_parameter/100 to calculate the point at which LCRs will spill to disk.
TIMED_STATISTICS	Recommended	Default: If STATISTICS_LEVEL is set to TYPICAL or ALL, then true If STATISTICS_LEVEL is set to BASIC, then false The default for STATISTICS_LEVEL is TYPICAL. Range: true or false	Specifies whether or not statistics related to time are collected. If you want to collect elapsed time statistics in the data dictionary views related to Streams, then set this parameter to true. The views that include elapsed time statistics include: V$STREAMS_CAPTURE V$STREAMS_APPLY_COORDINATOR V$STREAMS_APPLY_READER V$STREAMS_APPLY_SERVER
TRANSACTION_AUDITING=TRUE	Mandatory	Default: TRUE Range: true or false	If TRANSACTION_AUDITING is true, Oracle generates a special redo record that contains the user logon name, username, the session ID, some operating system information, and client information. For each successive transaction, Oracle generates a record that contains only the session ID. These subsequent records link back to the first record, which also contains the session ID. These records might be useful if you are using a redo log analysis tool. You can access the records by dumping the redo log. If TRANSACTION_AUDITING is false, no redo record will be generated. TRANSACTION_AUDITING must be set to TRUE for databases with a Streams capture process configured

An additional initialization parameter must be configured at each instance involved in the Oracle Real Application Clusters (Oracle RAC) configuration. In addition to the parameters referenced previously, the parameter Table 12–3 should be included.

Table 12–3 An Additional Initialization Parameter to Be Configured at Each Instance Involved in the Oracle RAC Configuration at the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
ARCHIVE_LAG_TARGET=1800	Recommended	Default: 0 Range: 0 or any integer in [60, 7200]	Limits the amount of data that can be lost and effectively increases the availability of the standby database by forcing a log switch after a user-specified time period elapses. If you are using Streams in a Real Application Clusters environment, then set this parameter to a value greater than zero to switch the log files automatically. See Also: The section titled "Streams Capture Processes and Oracle Real Application Clusters" in *Oracle9i Streams* release 2 (9.2)

12.2 Oracle Database 10*g* Release 1 (10.1) Audit Source Parameter Recommendations

At each participating source site, configure the initialization parameters for each database to include the following hidden parameters (see Table 12–4).

Table 12–4 Hidden Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
_job_queue_interval=1	Recommended	5	Scan rate interval (seconds) of job queue
_spin_count=5000	Recommended	2000	See the Oracle Magazine Tuning article from March 2003 for a discussion of this parameter. Set this parameter if Memory Queue and Memory Queue Subscriber latch sleeps are high.

At each participating source site, confirm that the following required initialization parameters are set appropriately for each database (see Table 12–5).

Table 12–5 Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
COMPATIBLE= 10.1.0	Mandatory	Default: 9.2.0 Range: 9.2.0 to Current Release Number Modifiable?: No	This parameter specifies the release with which the Oracle server must maintain compatibility. Oracle servers with different compatibility levels can interoperate. To use the new Streams features introduced in Oracle Database 10*g*, this parameter must be set to 10.1.0 or higher. To use downstream capture, this parameter must be set to 10.1.0 or higher at both the source database and the downstream database.
Cursor_space_for_time= FALSE This parameter has to be set to FALSE. Note that FALSE is the default value for this parameter.	Mandatory	Default: FALSE Range: FALSE or TRUE	Do not change this parameter when using Streams or Logical Standby.
GLOBAL_NAMES=true	Recommended	Default: false Range: true or false Modifiable?: Yes	Specifies whether a database link is required to have the same name as the database to which it connects. To use Streams to share information between databases, set this parameter to true at each database that is participating in your Streams environment.

Table 12–5 (Cont.) Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
JOB_QUEUE_ PROCESSES=4	Mandatory	Default: 0 Range: 0 to 1000 Modifiable?: Yes	Specifies the number of Jnnn job queue processes for each instance (J000 ... J999). Job queue processes handle requests created by DBMS_JOB. This parameter must be set to at least 2 at each database that is propagating events in your Streams environment, and should be set to the same value as the maximum number of jobs that can run simultaneously plus two.
LOG_ARCHIVE_DEST_n	Recommended	Default: None Range: None Modifiable?: Yes	Defines up to ten log archive destinations, where n is 1, 2, 3, ... 10. To use downstream capture and copy the redo log files to the downstream database using log transport services, at least one log archive destination must be at the site running the downstream capture process. See Also: *Oracle Data Guard Concepts and Administration*
LOG_ARCHIVE_DEST_ STATE_n	Recommended	Default: enable Range: One of the following: alternate reset defer enable Modifiable?: Yes	Specifies the availability state of the corresponding destination. The parameter suffix (1 through 10) specifies one of the ten corresponding LOG_ARCHIVE_DEST_n destination parameters. To use downstream capture and copy the redo log files to the downstream database using log transport services, ensure that the destination that corresponds to the LOG_ARCHIVE_DEST_n destination for the downstream database is set to enable.
OPEN_LINKS	Recommended	Default: 4 Range: 0 to 255 Modifiable?: No	Specifies the maximum number of concurrent open connections to remote databases in one session. These connections include database links, as well as external procedures and cartridges, each of which uses a separate process. In a Streams environment, ensure that this parameter is set to the default value of 4 or higher.
PARALLEL_MAX_ SERVERS Set this parameter to at least 20.	Mandatory	Default: Derived from the values of the following parameters: CPU_COUNT PARALLEL_ ADAPTIVE_ MULTI_USER PARALLEL_ AUTOMATIC_ TUNING Range: 0 to 3599 Modifiable?: Yes	Specifies the maximum number of parallel execution processes and parallel recovery processes for an instance. As demand increases, Oracle will increase the number of processes from the number created at instance startup up to this value. In a Streams environment, each capture process and apply process can use multiple parallel execution servers. Set this initialization parameter to an appropriate value to ensure that there are enough parallel execution servers.
PROCESSES	Recommended	Default: Derived from PARALLEL_ MAX_SERVERS Range: 6 to operating system dependent limit Modifiable?: No	Specifies the maximum number of operating system user processes that can simultaneously connect to Oracle. Ensure that the value of this parameter allows for all background processes, such as locks, job queue processes, and parallel execution processes. In Streams, capture processes and apply processes use background processes and parallel execution processes, and propagation jobs use job queue processes.
SESSIONS	Recommended	Default: Derived from: (1.1 * PROCESSES) + 5 Range: 1 to 231 Modifiable?: No	Specifies the maximum number of sessions that can be created in the system. To run one or more capture processes or apply processes in a database, then you may need to increase the size of this parameter. Each background process in a database requires a session.

Table 12–5 (Cont.) Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
`SGA_MAX_SIZE` Increase by at least 200M	Mandatory	Default: Initial size of SGA at startup Range: 0 to operating system dependent limit Modifiable?: No	Specifies the maximum size of SGA for the lifetime of a database instance. To run multiple capture processes on a single database, you may need to increase the size of this parameter.
`SHARED_POOL_SIZE`	Recommended	Default: 32-bit platforms: 32 MB, rounded up to the nearest granule size 64-bit platforms: 84 MB, rounded up to the nearest granule size Range: Minimum: the granule size Maximum: operating system dependent Modifiable?: Yes	Specifies (in bytes) the size of the shared pool. The shared pool contains shared cursors, stored procedures, control structures, and other structures. If the `STREAMS_POOL_SIZE` initialization parameter is set to zero, then Streams can use up to 10% of the shared pool.

Table 12–5 (Cont.) Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
STREAMS_POOL_ SIZE>200M If using sga_target, also increase this value by at least 200M.	Mandatory	Default: 0 Range: Minimum: 0 Maximum: operating system dependent Modifiable?: Yes	Specifies (in bytes) the size of the Streams pool. The Streams pool contains captured events. In addition, the Streams pool is used for internal communications during parallel capture and apply. If the size of the Streams pool is greater than zero, then any SGA memory used by Streams is allocated from the Streams pool. If the Streams pool size is set to zero, then SGA memory used by Streams is allocated from the shared pool and can use up to 10% of the shared pool. This parameter is modifiable. However, if this parameter is set to zero when an instance starts, then increasing it beyond zero has no effect on the current instance because it is using the shared pool for Streams allocations. Also, if this parameter is set to a value greater than zero when an instance starts and is then reduced to zero when the instance is running, then Streams processes and jobs will not run. You should increase the size of the Streams pool for each of the following factors: 10 MB for each capture process parallelism 1 MB for each apply process parallelism 10 MB or more for each queue staging captured events For example, if parallelism is set to 3 for a capture process, then increase the Streams pool by 30 MB. If parallelism is set to 5 for an apply process, then increase the Streams pool by 5 MB.
TIMED_STATISTICS	Recommended	Default: If STATISTICS_ LEVEL is set to TYPICAL or ALL, then true If STATISTICS_ LEVEL is set to BASIC, then false The default for STATISTICS_ LEVEL is TYPICAL. Range: true or false Modifiable?: Yes	Specifies whether or not statistics related to time are collected. To collect elapsed time statistics in the data dictionary views related to Streams, set this parameter to true. The views that include elapsed time statistics include: V$STREAMS_CAPTURE V$STREAMS_APPLY_COORDINATOR V$STREAMS_APPLY_READER V$STREAMS_APPLY_SERVER
UNDO_ RETENTION=3600	Mandatory	Default: 900 Range: 0 to 2^32-1 (max value represented by 32 bits) Modifiable?: Yes	Specifies (in seconds) the amount of committed undo information to retain in the database. For a database running one or more capture processes, ensure that this parameter is set to specify an adequate undo retention period. If you are running one or more capture processes and you are unsure about the proper setting, then try setting this parameter to at least 3600. If you encounter "snapshot too old" errors, then increase the setting for this parameter until these errors cease. Ensure that the undo tablespace has enough space to accommodate the UNDO_RETENTION setting. See Also: *Oracle Database Administrator's Guide* for more information about the retention period and the undo tablespace

12.3 Oracle Database 10*g* Release 2 (10.2) Audit Source Parameter Recommendations

For best results in a REDO collector environment, set the following initialization parameters at each participating database: `compatible`, `global_names`, `_job_queue_interval`, `sga_target`, `streams_pool_size`.

At each participating source site, configure the initialization parameters for each database to include the following hidden parameters (see Table 12–6).

Table 12–6 Hidden Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
`_job_queue_interval=1`	Recommended	5	Scan rate interval (seconds) of job queue
`_spin_count=5000`	Recommended	2000	See the Oracle Magazine Tuning article from March 2003 for a discussion of this parameter. Set this parameter if Memory Queue and Memory Queue Subscriber latch sleeps are high.

At each participating source site, confirm that the following required initialization parameters are set appropriately for each database (see Table 12–7). Enable autotuning of the various pools within the SGA, by setting `SGA_TARGET` to a large nonzero value. Leave the `STREAMS_POOL_SIZE` value set to 0. The combination of these to parameters enables autotuning of the SGA and the Streams Pool size will be automatically adjusted to meet the workload requirements.

Table 12–7 Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
`COMPATIBLE= 10.2.0`	Mandatory	Default: `10.0.0` Range: `9.2.0` to Current Release Number Modifiable?: No	This parameter specifies the release with which the Oracle server must maintain compatibility. Oracle servers with different compatibility levels can interoperate. To use the new Streams features introduced in Oracle Database 10*g* release 1, this parameter must be set to `10.1.0` or higher. To use downstream capture, this parameter must be set to `10.1.0` or higher at both the source database and the downstream database. To use the new Streams features introduced in Oracle Database 10*g* release 2, this parameter must be set to `10.2.0` or higher.
`GLOBAL_NAMES=true`	Recommended	Default: false Range: true or false Modifiable?: Yes	Specifies whether a database link is required to have the same name as the database to which it connects. To use Streams to share information between databases, set this parameter to `true` at each database that is participating in your Streams environment.
`JOB_QUEUE_PROCESSES=4`	Mandatory	Default: 0 Range: 0 to 1000 Modifiable?: Yes	Specifies the number of Jnnn job queue processes for each instance (J000 ... J999). Job queue processes handle requests created by `DBMS_JOB`. This parameter must be set to at least 2 at each database that is propagating events in your Streams environment, and should be set to the same value as the maximum number of jobs that can run simultaneously plus two.

Table 12–7 (Cont.) Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
LOG_ARCHIVE_DEST_n	Recommended	Default: None Range: None Modifiable?: Yes	Defines up to ten log archive destinations, where n is 1, 2, 3, ... 10. To use downstream capture and copy the redo log files to the downstream database using log transport services, at least one log archive destination must be at the site running the downstream capture process. See Also: *Oracle Data Guard Concepts and Administration*
LOG_ARCHIVE_DEST_STATE_n	Recommended	Default: enable Range: One of the following: alternate reset defer enable Modifiable?: Yes	Specifies the availability state of the corresponding destination. The parameter suffix (1 through 10) specifies one of the ten corresponding LOG_ARCHIVE_DEST_n destination parameters. To use downstream capture and copy the redo log files to the downstream database using log transport services, ensure that the destination that corresponds to the LOG_ARCHIVE_DEST_n destination for the downstream database is set to enable.
OPEN_LINKS	Recommended	Default: 4 Range: 0 to 255 Modifiable?: No	Specifies the maximum number of concurrent open connections to remote databases in one session. These connections include database links, as well as external procedures and cartridges, each of which uses a separate process. In a Streams environment, ensure that this parameter is set to the default value of 4 or higher.
PARALLEL_MAX_SERVERS Set this parameter to at least 20.	Mandatory	Default: Derived from the values of the following parameters: CPU_COUNT PARALLEL_ADAPTIVE_MULTI_USER PARALLEL_AUTOMATIC_TUNING Range: 0 to 3599 Modifiable?: Yes	Specifies the maximum number of parallel execution processes and parallel recovery processes for an instance. As demand increases, Oracle will increase the number of processes from the number created at instance startup up to this value. In a Streams environment, each capture process and apply process can use multiple parallel execution servers. Set this initialization parameter to an appropriate value to ensure that there are enough parallel execution servers.
PROCESSES	Recommended	Default: Derived from PARALLEL_MAX_SERVERS Range: 6 to operating system dependent limit Modifiable?: No	Specifies the maximum number of operating system user processes that can simultaneously connect to Oracle. Ensure that the value of this parameter allows for all background processes, such as locks, job queue processes, and parallel execution processes. In Streams, capture processes and apply processes use background processes and parallel execution processes, and propagation jobs use job queue processes.
SESSIONS	Recommended	Default: Derived from: (1.1 * PROCESSES) + 5 Range: 1 to 231 Modifiable?: No	Specifies the maximum number of sessions that can be created in the system. To run one or more capture processes or apply processes in a database, then you may need to increase the size of this parameter. Each background process in a database requires a session.
SGA_MAX_SIZE Increase by at least 200M	Mandatory	Default: Initial size of SGA at startup Range: 0 to operating system dependent limit Modifiable?: No	Specifies the maximum size of SGA for the lifetime of a database instance. To run multiple capture processes on a single database, you may need to increase the size of this parameter. See the STREAMS_POOL_SIZE initialization parameter for more specific recommendations.

Table 12–7 (Cont.) Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
`SGA_TARGET >0` Increase this parameter by at least 200M.	Mandatory	Default: 0 (SGA autotuning is disabled) Range: 64 to operating system-dependent Modifiable?: Yes	Specifies the total size of all System Global Area (SGA) components. If this parameter is set to a nonzero value, then the size of the Streams pool is managed by Automatic Shared Memory Management. See the `STREAMS_POOL_SIZE` initialization parameter for more specific recommendations.
`SHARED_POOL_SIZE=0`	Recommended	Default: 32-bit platforms: 32 MB, rounded up to the nearest granule size 64-bit platforms: 84 MB, rounded up to the nearest granule size Range: Minimum: the granule size Maximum: operating system-dependent Modifiable?: Yes	Specifies (in bytes) the size of the shared pool. The shared pool contains shared cursors, stored procedures, control structures, and other structures. If the `SGA_TARGET` and `STREAMS_POOL_SIZE` initialization parameters are set to zero, then Streams transfers an amount equal to 10% of the shared pool from the buffer cache to the Streams pool.

Table 12–7 (Cont.) Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
STREAMS_POOL_ SIZE=200	Mandatory	Default: 0 Range: Minimum: 0 Maximum: operating system-dependent Modifiable?: Yes	Specifies (in bytes) the size of the Streams pool. The Streams pool contains captured events. In addition, the Streams pool is used for internal communications during parallel capture and apply. If the SGA_TARGET initialization parameter is set to a nonzero value, then the Streams pool size is set by Automatic Shared memory management, and STREAMS_POOL_SIZE specifies the minimum size. The STREAMS_POOL_SIZE initialization parameter should be set to 200 MB and, if necessary, increment the SGA_TARGET and SGA_MAX initialization parameters appropriately. For example, if the SGA_TARGET initialization parameter is already set to 2 GB, setting STREAMS_POOL_SIZE=200 MB would not require that the SGA_TARGET initialization parameter be increased. However, if the SGA_TARGET initialization parameter is set to 600 MB and the STREAMS_ POOL_SIZE initialization parameter is increased to 200 MB, then it is recommended that the SGA_TARGET initialization parameter value be increased similarly. This parameter is modifiable. If this parameter is reduced to zero when an instance is running, then Streams processes and jobs will not run. You should increase the size of the Streams pool for each of the following factors: 10 MB for each capture process parallelism 10 MB or more for each buffered queue. The buffered queue is where the Logical Change Records(LCRs) are stored. 1 MB for each apply process parallelism You can use the V$STREAMS_POOL_ADVICE dynamic performance view to determine an appropriate setting for this parameter. For example, if parallelism is set to 3 for a capture process, then increase the Streams pool by 30 MB. If parallelism is set to 5 for an apply process, then increase the Streams pool by 5 MB.
TIMED_STATISTICS	Recommended	Default: If STATISTICS_ LEVEL is set to TYPICAL or ALL, then true If STATISTICS_ LEVEL is set to BASIC, then false The default for STATISTICS_ LEVEL is TYPICAL. Range: true or false Modifiable?: Yes	Specifies whether or not statistics related to time are collected. To collect elapsed time statistics in the data dictionary views related to Stream, set this parameter to true. The views that include elapsed time statistics include: V$STREAMS_CAPTURE V$STREAMS_APPLY_COORDINATOR V$STREAMS_APPLY_READER V$STREAMS_APPLY_SERVER

Table 12–7 (Cont.) Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
UNDO_ RETENTION=3600	Mandatory	Default: 900 Range: 0 to 2^32-1 (max value represented by 32 bits) Modifiable?: Yes	Specifies (in seconds) the amount of committed undo information to retain in the database. For a database running one or more capture processes, ensure that this parameter is set to specify an adequate undo retention period. If you are running one or more capture processes and you are unsure about the proper setting, then try setting this parameter to at least 3600. If you encounter "snapshot too old" errors, then increase the setting for this parameter until these errors cease. Ensure that the undo tablespace has enough space to accommodate the UNDO_RETENTION setting. See Also: *Oracle Database Administrator's Guide* for more information about the UNDO_RETENTION parameter

12.4 Oracle Database 11*g* Release 1 (11.1) Audit Source Parameter Recommendations

For best results in a REDO collector environment, set the following initialization parameters at each participating database: compatible, global_names, _job_queue_interval, sga_target, streams_pool_size.

At each participating source site, configure the initialization parameters for each database to include the following hidden parameters (see Table 12–6).

Table 12–8 Hidden Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
_job_queue_interval=1	Recommended	5	Scan rate interval (seconds) of job queue
_spin_count=5000	Recommended	2000	See the Oracle Magazine Tuning article from March 2003 for a discussion of this parameter. Set this parameter if Memory Queue and Memory Queue Subscriber latch sleeps are high.

At each participating source site, confirm that the following required initialization parameters are set appropriately for each database (see Table 12–7). Enable autotuning of the various pools within the SGA, by setting SGA_TARGET to a large nonzero value. Leave the STREAMS_POOL_SIZE value set to 0. The combination of these to parameters enables autotuning of the SGA and the Streams Pool size will be automatically adjusted to meet the workload requirements.

Table 12–9 Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
COMPATIBLE= 11.1.0	Mandatory	Default: 11.1.0 Range: 10.1.0 to Current Release Number Modifiable?: No	This parameter specifies the release with which the Oracle server must maintain compatibility. Oracle servers with different compatibility levels can interoperate. To use the new Streams features introduced in Oracle Database 10*g* release 1, this parameter must be set to 10.1.0 or higher. To use downstream capture, this parameter must be set to 10.1.0 or higher at both the source database and the downstream database. To use the new Streams features introduced in Oracle Database 10*g* release 2, this parameter must be set to 10.2.0 or higher. To use the new Streams features introduced in Oracle Database 11*g* release 1, this parameter must be set to 11.1.0 or higher.
GLOBAL_NAMES=true	Recommended	Default: false Range: true or false Modifiable?: Yes	Specifies whether a database link is required to have the same name as the database to which it connects. To use Streams to share information between databases, set this parameter to true at each database that is participating in your Streams environment.
JOB_QUEUE_ PROCESSES=4	Mandatory	Default: 0 Range: 0 to 1000 Modifiable?: Yes	Specifies the number of Jnnn job queue processes for each instance (J000 ... J999). Job queue processes handle requests created by DBMS_JOB. This parameter must be set to at least 2 at each database that is propagating events in your Streams environment, and should be set to the same value as the maximum number of jobs that can run simultaneously plus two.
LOG_ARCHIVE_DEST_n	Recommended	Default: None Range: None Modifiable?: Yes	Defines up to ten log archive destinations, where n is 1, 2, 3, ... 10. To use downstream capture and copy the redo log files to the downstream database using log transport services, at least one log archive destination must be at the site running the downstream capture process. See Also: *Oracle Data Guard Concepts and Administration*
LOG_ARCHIVE_DEST_ STATE_n	Recommended	Default: enable Range: One of the following: alternate reset defer enable Modifiable?: Yes	Specifies the availability state of the corresponding destination. The parameter suffix (1 through 10) specifies one of the ten corresponding LOG_ARCHIVE_DEST_n destination parameters. To use downstream capture and copy the redo log files to the downstream database using log transport services, ensure that the destination that corresponds to the LOG_ARCHIVE_DEST_ n destination for the downstream database is set to enable.
OPEN_LINKS	Recommended	Default: 4 Range: 0 to 255 Modifiable?: No	Specifies the maximum number of concurrent open connections to remote databases in one session. These connections include database links, as well as external procedures and cartridges, each of which uses a separate process. In a Streams environment, ensure that this parameter is set to the default value of 4 or higher.
PROCESSES	Recommended	Default: Derived from PARALLEL_ MAX_SERVERS Range: 6 to operating system dependent limit Modifiable?: No	Specifies the maximum number of operating system user processes that can simultaneously connect to Oracle. Ensure that the value of this parameter allows for all background processes, such as locks, job queue processes, and parallel execution processes. In Streams, capture processes and apply processes use background processes and parallel execution processes, and propagation jobs use job queue processes.

Table 12–9 (Cont.) Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
SESSIONS	Recommended	Default: Derived from: (1.1 * PROCESSES) + 5 Range: 1 to 231 Modifiable?: No	Specifies the maximum number of sessions that can be created in the system. To run one or more capture processes or apply processes in a database, then you may need to increase the size of this parameter. Each background process in a database requires a session.
SGA_MAX_SIZE Increase by at least 200M	Mandatory	Default: Initial size of SGA at startup Range: 0 to operating system dependent limit Modifiable?: No	Specifies the maximum size of SGA for the lifetime of a database instance. To run multiple capture processes on a single database, you may need to increase the size of this parameter. See the STREAMS_POOL_SIZE initialization parameter for more specific recommendations.
SGA_TARGET >0 Increase this parameter by at least 200M.	Mandatory	Default: 0 (SGA autotuning is disabled) Range: 64 to operating system-dependent Modifiable?: Yes	Specifies the total size of all System Global Area (SGA) components. If this parameter is set to a nonzero value, then the size of the Streams pool is managed by Automatic Shared Memory Management. See the STREAMS_POOL_SIZE initialization parameter for more specific recommendations.
SHARED_POOL_SIZE=0	Recommended	Default: 32-bit platforms: 32 MB, rounded up to the nearest granule size 64-bit platforms: 84 MB, rounded up to the nearest granule size Range: Minimum: the granule size Maximum: operating system-dependent Modifiable?: Yes	Specifies (in bytes) the size of the shared pool. The shared pool contains shared cursors, stored procedures, control structures, and other structures. If the SGA_TARGET and STREAMS_POOL_SIZE initialization parameters are set to zero, then Streams transfers an amount equal to 10% of the shared pool from the buffer cache to the Streams pool. The STREAMS_POOL_SIZE initialization parameter should be set to 200 MB and, if necessary, increment the SGA_TARGET and SGA_MAX initialization parameters appropriately. For example, if the SGA_TARGET initialization parameter is already set to 2 GB, setting STREAMS_POOL_SIZE=200 MB would not require that the SGA_TARGET initialization parameter be increased. However, if the SGA_TARGET initialization parameter is set to 600 MB and the STREAMS_POOL_SIZE initialization parameter is increased to 200 MB, then it is recommended that the SGA_TARGET initialization parameter value be increased similarly.

Table 12–9 (Cont.) Initialization Parameters to Be Configured for the Database Source

Parameter Name and Recommendation	Mandatory or Recommended Parameter	Default Value	Description
STREAMS_POOL_SIZE=200	Mandatory	Default: 0 Range: Minimum: 0 Maximum: operating system-dependent Modifiable?: Yes	Specifies (in bytes) the size of the Streams pool. The Streams pool contains captured events. In addition, the Streams pool is used for internal communications during parallel capture and apply. If the SGA_TARGET initialization parameter is set to a nonzero value, then the Streams pool size is set by Automatic Shared memory management, and STREAMS_POOL_SIZE specifies the minimum size. This parameter is modifiable. If this parameter is reduced to zero when an instance is running, then Streams processes and jobs will not run. You should increase the size of the Streams pool for each of the following factors: 10 MB for each capture process parallelism 10 MB or more for each buffered queue. The buffered queue is where the Logical Change Records(LCRs) are stored. 1 MB for each apply process parallelism You can use the V$STREAMS_POOL_ADVICE dynamic performance view to determine an appropriate setting for this parameter. For example, if parallelism is set to 3 for a capture process, then increase the Streams pool by 30 MB. If parallelism is set to 5 for an apply process, then increase the Streams pool by 5 MB.
TIMED_STATISTICS	Recommended	Default: If STATISTICS_LEVEL is set to TYPICAL or ALL, then true If STATISTICS_LEVEL is set to BASIC, then false The default for STATISTICS_LEVEL is TYPICAL. Range: true or false Modifiable?: Yes	Specifies whether or not statistics related to time are collected. To collect elapsed time statistics in the data dictionary views related to Stream, set this parameter to true. The views that include elapsed time statistics include: V$STREAMS_CAPTURE V$STREAMS_APPLY_COORDINATOR V$STREAMS_APPLY_READER V$STREAMS_APPLY_SERVER
UNDO_RETENTION=3600	Mandatory	Default: 900 Range: 0 to 2^32-1 (max value represented by 32 bits) Modifiable?: Yes	Specifies (in seconds) the amount of committed undo information to retain in the database. For a database running one or more capture processes, ensure that this parameter is set to specify an adequate undo retention period. If you are running one or more capture processes and you are unsure about the proper setting, then try setting this parameter to at least 3600. If you encounter "snapshot too old" errors, then increase the setting for this parameter until these errors cease. Ensure that the undo tablespace has enough space to accommodate the UNDO_RETENTION setting. See Also: *Oracle Database Administrator's Guide* for more information about the UNDO_RETENTION parameter

13

Oracle Audit Vault Data Dictionary Views

This appendix contains:

- Oracle Audit Vault-Specific Data Dictionary Views
- DBMS_AUDIT_MGMT Data Dictionary Views

13.1 Oracle Audit Vault-Specific Data Dictionary Views

Table 13–1 lists the Oracle Audit Vault data dictionary views.

Table 13–1 Oracle Audit Vault Data Dictionary Views

Data Dictionary View	Description
ADM_AGENTS	Displays information about the source database host that is associated with Oracle Audit Vault agents.
ADM_COLLECTOR_ATTRIBUTES	Displays attribute information about existing collectors.
ADM_COLLECTORS	Displays information about collectors and agents that are associated with specific source databases.
ADM_COLLECTORTYPE_ATTRDEFS	Displays information about the attribute definitions for configured collector types.
ADM_COLLECTORTYPES	Displays information about the types of collectors associated with a source database type.
ADM_EVENT_MAPPINGS	Displays mapping information between source databases and their associated audit events.
ADM_EVENTS	Displays information about audit events and categories.
ADM_FORMAT_ATTRIBUTES	Displays detailed information about audit event attributes that are used with event categories.
ADM_SOURCE_ATTRIBUTES	Displays information about the attributes that are associated with a particular source database
ADM_SOURCES	Describes information about the source databases that you have configured for Oracle Audit Vault, such as their host connection information.
ADM_SOURCETYPES	Describes the type of database the source database is, such as its minimum supported version for Oracle Audit Vault.
ADM_SOURCETYPE_ATTRDEFS	Displays detailed information about the source database attribute definitions.

13.1.1 ADM_AGENTS

The ADM_AGENTS data dictionary view displays information about the source database host that is associated with Oracle Audit Vault agents.

Column	Datatype	Null	Description
AGENT_NAME	VARCHAR2(255)	NOT NULL	Name of the agent that you created using the add_collector command of the AVSQLSRVDB or AVSYBDB utility, or the add_source command of the AVORCLDB utility.
DESCRIPTION	VARCHAR2(255)		Description of this agent.
HOST	VARCHAR2(255)		Host computer on which the source database is installed.
PORT	NUMBER		Port number of the source database.
USERNAME	VARCHAR2(30)		Name of the user account that was configured for the source database. See the following sections for more information: ■ **Oracle Database**: Section 2.3.2 ■ **Microsoft SQL Server**: Section 2.4.2 ■ **Sybase ASE**: Section 2.5.2 ■ **IBM DB2**: Section 2.6.2
SECURE	NUMBER		**TBA**

Example

```
SQL> SELECT AGENT_NAME FROM AVSYS.ADM_AGENTS WHERE USERNAME = 'SRCUSER_ORA';
```

13.1.2 ADM_COLLECTOR_ATTRIBUTES

The ADM_COLLECTOR_ATTRIBUTES data dictionary view displays attribute information about existing collectors.

Column	Datatype	Null	Description
COLLECTOR_NAME	VARCHAR2(255)	NOT NULL	Name of the collector.
SOURCE_NAME	VARCHAR2(255)	NOT NULL	Name of the source database associated with this collector.
ATTRIBUTE_NAME	VARCHAR2(30)	NOT NULL	Names of the attributes assigned to the collector. See the usage notes for the alter_collector command in the AVORCLDB, AVMSSQLDB, and AVSYBDB utility commands in the following sections: ■ Section 8.4 (AVORCLDB) ■ Section 9.4 (AVMSSQLDB) ■ Section 10.4 (AVSYBDB) ■ Section 11.4 (AVDB2DB)
ATTRIBUTE_TYPE	NUMBER	NOT NULL	Type of attribute associated with the attribute name. See the usage notes mentioned in the ATTRIBUTE_NAME column description for more information.

Column	Datatype	Null	Description
CHAR_VALUE	VARCHAR2(4000)		The value of the attribute if it is in the VARCHAR2 (4000) datatype

Example

```
TBA
```

13.1.3 ADM_COLLECTORS

The ADM_COLLECTORS data dictionary view displays information about collectors and agents that are associated with specific source databases.

Column	Datatype	Null	Description
SOURCE_NAME	VARCHAR2(255)	NOT NULL	Name of the source database.
COLLECTORTYPE_NAME	VARCHAR2(255)	NOT NULL	User-created name for the collector. See Table 1–4 on page 1-4 for more information about the collector types.
COLLECTOR_NAME	VARCHAR2(255)	NOT NULL	Names of the collectors associated with the source database.
DESCRIPTION	VARCHAR2(255)		Description of the collector.
AGENT_NAME	VARCHAR2(255)	NOT NULL	Name of the agent associated with the collector.

Example

```
SQL> SELECT SOURCE_NAME FROM AVSYS.ADM_COLLECTORS WHERE COLLECTORTYPE_NAME =
'SYBDB';

SOURCE_NAME
-----------------
SYB_SALES_DB
```

13.1.4 ADM_COLLECTORTYPE_ATTRDEFS

The ADM_COLLECTORTYPE_ATTRDEFS data dictionary view displays information about the attribute definitions for configured collector types.

Column	Datatype	Null	Description
COLLECTORTYPE_NAME	VARCHAR2(255)	NOT NULL	User-created name for the collector. See Table 1–4 on page 1-4 for more information about the collector types.
SOURCETYPE_NAME	VARCHAR2(255)	NOT NULL	One of the following source database types: ■ **Oracle Database**: ORCLDB ■ **Microsoft SQL Server**: MSSQLDB ■ **Sybase ASE**: SYBDB ■ **IBM DB2**: DB2DB

Column	Datatype	Null	Description
ATTRIBUTE_NAME	VARCHAR2(30)	NOT NULL	Names of the attributes assigned to the collector. See the usage notes for the alter_collector command in the AVORCLDB, AVMSSQLDB, and AVSYBDB utility commands in the following sections: ■ Section 8.4 (AVORCLDB) ■ Section 9.4 (AVMSSQLDB) ■ Section 10.4 (AVSYBDB) ■ Section 11.4 (AVDB2DB)
DESCRIPTION	VARCHAR2(255)		Description of the attribute listed in the ATTRIBUTE_NAME column.
ATTRIBUTE_TYPE	NUMBER	NOT NULL	Type of attribute. See the usage notes mentioned in the ATTRIBUTE_NAME column description for more information.
ATTRIBUTE_LENGTH	NUMBER		**TBA**
DEFAULT_VALUE	ANYDATA()		**TBA**
CONSTRAINTS	NUMBER		**TBA**

Example

```
TBA
```

13.1.5 ADM_COLLECTORTYPES

The ADM_COLLECTORTYPES data dictionary view displays information about the types of collectors associated with a source database type.

Column	Datatype	Null	Description
COLLECTORTYPE_NAME	VARCHAR2(255)	NOT NULL	User-created name for the collector. See Table 1–4 on page 1-4 for more information about the collector types.
DESCRIPTION	VARCHAR2(255)	NOT NULL	Description of the collector type.
SOURCETYPE_NAME	VARCHAR2(255)	NOT NULL	One of the following source database types: ■ **Oracle Database**: ORCLDB ■ **Microsoft SQL Server**: MSSQLDB ■ **Sybase ASE**: SYBDB ■ **IBM DB2**: DB2DB
COLLECTOR_MODULE	VARCHAR2(255)	NOT NULL	**TBA** For example, oracle.av.plugin.sql.collector.SQLCollectorManager

Example

```
TBA
```

13.1.6 ADM_EVENT_MAPPINGS

The ADM_EVENT_MAPPINGS data dictionary view displays mapping information between source databases and their associated audit events.

Column	Datatype	Null	Description
SOURCETYPE_NAME	VARCHAR2(255)	NOT NULL	One of the following source database types: ■ **Oracle Database**: ORCLDB ■ **Microsoft SQL Server**: MSSQLDB ■ **Sybase ASE**: SYBDB ■ **IBM DB2**: DB2DB
SOURCETYPE_EVENTNAME	VARCHAR2(255)	NOT NULL	**TBA**
DESCRIPTION	VARCHAR2(255)		Description of this type of mapping.
EVENT_NAME	VARCHAR2(30)	NOT NULL	Name of the event associated with the audit event category, for example, CREATE TABLE. See *Oracle Audit Vault Auditor's Guide* for detailed information about audit events and their categories.
CAT_NAME	VARCHAR2(255)	NOT NULL	Audit event category associated with the event.

Example

TBA

13.1.7 ADM_EVENTS

The ADM_EVENTS data dictionary view displays information about audit events and categories.

Column	Datatype	Null	Description
EVENT_NAME	VARCHAR2(30)	NOT NULL	Name of the event associated with the audit event category, for example, CREATE TABLE. See *Oracle Audit Vault Auditor's Guide* for detailed information about audit events and their categories.
DESCRIPTION	VARCHAR2(255)		Description of the audit event listed in the EVENT_NAME column.
CAT_NAME	VARCHAR2(255)	NOT NULL	Audit event category associated with the event.

Example

TBA

13.1.8 ADM_FORMAT_ATTRIBUTES

The ADM_FORMAT_ATTRIBUTES data dictionary view displays detailed information about audit event attributes that are used with event categories.

Column	Datatype	Null	Description
ATTRIBUTE_NAME	VARCHAR2(30)	NOT NULL	Name of the attribute associated with the audit events, for example, DATABASE_ID. See *Oracle Audit Vault Auditor's Guide* for detailed information about the attributes of the audit event categories.
DESCRIPTION	VARCHAR2(255)		Description of the attribute.
ATTRIBUTE_TYPE	NUMBER	NOT NULL	Type of attribute. For more information, see the usage notes mentioned in the ATTRIBUTE_NAME column description.
ATTRIBUTE_LENGTH	NUMBER		**TBA**
DIMENSION	VARCHAR2(30)		**TBA**.
DIM_LEVEL	VARCHAR2(30)		**TBA**
CONSTRAINTS	NUMBER		**TBA**
SOURCETYPE_NAME	VARCHAR2(255)		One of the following source database types: ■ **Oracle Database**: ORCLDB ■ **Microsoft SQL Server**: MSSQLDB ■ **Sybase ASE**: SYBDB ■ **IBM DB2**: DB2DB
CAT_NAME	VARCHAR2(255)	NOT NULL	Audit event category associated with the attribute. See *Oracle Audit Vault Auditor's Guide* for detailed information about the audit event categories.

Example

```
TBA
```

13.1.9 ADM_SOURCE_ATTRIBUTES

The ADM_SOURCE_ATTRIBUTES data dictionary view displays information about the attributes that are associated with a particular source database.

Column	Datatype	Null	Description
SOURCE_NAME	VARCHAR2(255)	NOT NULL	Name of the source database.

Column	Datatype	Null	Description
ATTRIBUTE_NAME	VARCHAR2(30)	NOT NULL	Names of the attributes used in the source database. See the usage notes for the alter_collector command in the AVORCLDB, AVMSSQLDB, and AVSYBDB utility commands in the following sections: ■ Section 8.4 (AVORCLDB) ■ Section 9.4 (AVMSSQLDB) ■ Section 10.4 (AVSYBDB) ■ Section 11.4 (AVDB2DB)
ATTRIBUTE_TYPE	NUMBER	NOT NULL	Type of attribute. See the usage notes mentioned in the ATTRIBUTE_NAME column description.
NUM_VALUE	NUMBER		The value of the attribute if it is in the NUMBER datatype
CHAR_VALUE	VARCHAR2(4000)		The value of the attribute if it is in the VARCHAR2 (4000) datatype
CLOB_VALUE	CLOB()		The value of the attribute if it is in the CLOB datatype
DATE_VALUE	DATE		Date the source database was configured with Oracle Audit Vault
TIME_VALUE	TIMESTAMP(6) WITH LOCAL TIME ZONE		Last time the source database attributes were updated

Example

```
TBA
```

13.1.10 ADM_SOURCES

The ADM_SOURCES data dictionary view describes information about the source databases that you have configured for Oracle Audit Vault.

Column	Datatype	Null	Description
SOURCE_NAME	VARCHAR2(255)	NOT NULL	Name of the source database.
SOURCETYPE_NAME	VARCHAR2(255)	NOT NULL	One of the following source database types: ■ **Oracle Database**: ORCLDB ■ **Microsoft SQL Server**: MSSQLDB ■ **Sybase ASE**: SYBDB ■ **IBM DB2**: DB2DB
DESCRIPTION	VARCHAR2(255)		Description of the source database.
SOURCE_VERSION	VARCHAR2(30)	NOT NULL	Version number of the source database, for example, 9.0.0.1 for Oracle Database Release 9*i*.
SOURCE_HOST	VARCHAR2(255)		Host computer on which the source database resides.

Column	Datatype	Null	Description
SOURCE_IP	VARCHAR2(30)		IP address of the host computer on which the source database resides.
AUTHENTICATION	NUMBER		Authentication method used for the source database, for example, password authentication for an Oracle database.
USER_NAME	VARCHAR2(30)		Name of the user account that was configured for the source database. See the following sections for more information: ■ **Oracle Database**: Section 2.3.2 ■ **Microsoft SQL Server**: Section 2.4.2 ■ **Sybase ASE**: Section 2.5.2 ■ **IBM DB2**: Section 2.6.2
TIME_ZONE	VARCHAR2(30)		**TBA**
CREATE_TIME	TIMESTAMP(6) WITH LOCAL TIME ZONE	NOT NULL	**REVIEWERS: VERIFY THE FOLLOWING** Time the source database was configured with Oracle Audit Vault.
CREATOR	VARCHAR2(255)	NOT NULL	**REVIEWERS: VERIFY THE FOLLOWING** Name of the user account that created this database.
MODIFIED_TIME	TIMESTAMP(6) WITH LOCAL TIME ZONE	NOT NULL	**REVIEWERS: NEED INFO**
MODIFIER	VARCHAR2(255)	NOT NULL	**REVIEWERS: NEED INFO**

Example

```
TBA
```

13.1.11 ADM_SOURCETYPES

The ADM_SOURCETYPES data dictionary view describes the type of database the source database is, such as its minimum supported version for Oracle Audit Vault.

Column	Datatype	Null	Description
SOURCETYPE_NAME	VARCHAR2(255)	NOT NULL	One of the following source database types: ■ **Oracle Database**: ORCLDB ■ **Microsoft SQL Server**: MSSQLDB ■ **Sybase ASE**: SYBDB ■ **IBM DB2**: DB2DB
DESCRIPTION	VARCHAR2(255)		Description of the source database type, for example, Sybase Adaptive Server Enterprise if the SOURCETYPE_NAME column setting is SYBDB.

Column	Datatype	Null	Description
MIN_SUPPORTED_VERSION	VARCHAR2(30)	NOT NULL	Minimum supported version of the source database type.
BASE_FORMAT_NAME	VARCHAR2(30)		**TBA**, for example, AV_AUDIT_RECORD_ORCLDB for Oracle Database.
CREATE_TIME	TIMESTAMP(6) WITH LOCAL TIME ZONE	NOT NULL	Time the source database was configured with Oracle Audit Vault.
CREATOR	VARCHAR2(255)	NOT NULL	User account of the person who configured the source database with Oracle Audit Vault. For more information about this user, see the following sections: ■ **Oracle Database**: Section 2.3.2 ■ **Microsoft SQL Server**: Section 2.4.2 ■ **Sybase ASE**: Section 2.5.2 ■ **IBM DB2**: Section 2.6.2
MODIFIED_TIME	TIMESTAMP(6) WITH LOCAL TIME ZONE	NOT NULL	Last time the source database was configured with Oracle Audit Vault.
MODIFIER	VARCHAR2(255)	NOT NULL	**TBA**, for example SYS or AVADMIN.

Example

TBA

13.1.12 ADM_SOURCETYPE_ATTRDEFS

The ADM_COLLECTORTYPE_ATTRDEFS data dictionary view displays detailed information about the source database attribute definitions.

Column	Datatype	Null	Description
SOURCETYPE_NAME	VARCHAR2(255)	NOT NULL	One of the following source database types: ■ **Oracle Database**: ORCLDB ■ **Microsoft SQL Server**: MSSQLDB ■ **Sybase ASE**: SYBDB ■ **IBM DB2**: DB2DB
ATTRIBUTE_NAME	VARCHAR2(30)	NOT NULL	Names of the attributes available for the source database type. See the usage notes for the alter_collector command in the AVORCLDB, AVMSSQLDB, and AVSYBDB utility commands in the following sections: ■ Section 8.4 (AVORCLDB) ■ Section 9.4 (AVMSSQLDB) ■ Section 10.4 (AVSYBDB) ■ Section 11.4 (AVDB2DB)

Column	Datatype	Null	Description
DESCRIPTION	VARCHAR2(255)		Description of the attribute listed in the ATTRIBUTE_NAME column.
ATTRIBUTE_TYPE	NUMBER	NOT NULL	Attribute type. See the usage notes mentioned in the ATTRIBUTE_NAME column description.
ATTRIBUTE_LENGTH	NUMBER		**TBA**
DEFAULT_VALUE	ANYDATA()		**TBA**
CONSTRAINTS	NUMBER		**REVIEWERS: NEED INFO**

Example

TBA

13.2 DBMS_AUDIT_MGMT Data Dictionary Views

The DBMS_AUDIT_MGMT data dictionary views describe audit configuration settings that you create with the DBMS_AUDIT_MGMT PL/SQL package. Chapter 14 describes this package in detail.

Table 13–2 lists data dictionary views that are described in this section.

Table 13–2 DBMS_AUDIT_MGMT Data Dictionary Views

Data Dictionary View	Description
DBA_AUDIT_MGMT_CONFIG_PARAMS	Displays the currently configured audit trail properties that are used by the DBMS_AUDIT_MGMT PL/SQL package
DBA_AUDIT_MGMT_LAST_ARCH_TS	Displays the last archive timestamps that have been set for audit trail cleanup or purges.
DBA_AUDIT_MGMT_CLEANUP_JOBS	Displays the currently configured audit trail cleanup or purge jobs
DBA_AUDIT_MGMT_CLEAN_EVENTS	Displays the history of cleanup or purge events. Periodically, as user SYS connected with the SYSDBA privilege, you should delete the contents of this view so that it will not grow too large. For example: DELETE FROM DBA_AUDIT_MGMT_CLEAN_EVENTS;

13.2.1 DBA_AUDIT_MGMT_CONFIG_PARAMS

The DBA_AUDIT_MGMT_CONFIG_PARAMS data dictionary view displays the currently configured audit trail properties that are used by the DBMS_AUDIT_MGMT PL/SQL package.

Column	Datatype	Null	Description
PARAMETER_NAME	VARCHAR2(1024)	NOT NULL	Name of the property
PARAMETER_VALUE	VARCHAR2(4000)		Value of the property

Column	Datatype	Null	Description
AUDIT_TRAIL	VARCHAR2(28)		Audit trails for which the property is configured: - STANDARD AUDIT TRAIL - FGA AUDIT TRAIL - STANDARD AND FGA AUDIT TRAIL - OS AUDIT TRAIL - XML AUDIT TRAIL - OS AND XML AUDIT TRAIL - ALL AUDIT TRAILS

13.2.2 DBA_AUDIT_MGMT_LAST_ARCH_TS

The DBA_AUDIT_MGMT_LAST_ARCH_TS data dictionary view displays the last archive timestamps set for audit trail cleanup or purges.

Column	Datatype	Null	Description
AUDIT_TRAIL	VARCHAR2(20)		Audit trail for which the last archive timestamp applies: - STANDARD AUDIT TRAIL - FGA AUDIT TRAIL - OS AUDIT TRAIL - XML AUDIT TRAIL
RAC_INSTANCE	NUMBER	NOT NULL	Oracle RAC instance number for which the last archive timestamp applies. 0 implies "Not Applicable".
LAST_ARCHIVE_TS	TIMESTAMP(6) WITH TIMEZONE		Timestamp of the last audit record or audit file that has been archived

13.2.3 DBA_AUDIT_MGMT_CLEANUP_JOBS

The DBA_AUDIT_MGMT_CLEANUP_JOBS data dictionary view displays the currently configured audit trail cleanup or purge jobs.

Column	Datatype	Null	Description
JOB_NAME	VARCHAR2(100)	NOT NULL	Name of the audit trail purge job
JOB_STATUS	VARCHAR2(8)		Current status of the audit trail purge job (ENABLED) or (DISABLED)

Column	Datatype	Null	Description
AUDIT_TRAIL	VARCHAR2(28)		Audit trail for which the audit trail purge job is configured: ■ STANDARD AUDIT TRAIL ■ FGA AUDIT TRAIL ■ STANDARD AND FGA AUDIT TRAIL ■ OS AUDIT TRAIL ■ XML AUDIT TRAIL ■ OS AND XML AUDIT TRAIL ■ ALL AUDIT TRAILS
JOB_FREQUENCY	VARCHAR2(100)		Frequency at which the audit trail purge job runs

13.2.4 DBA_AUDIT_MGMT_CLEAN_EVENTS

The DBA_AUDIT_MGMT_CLEAN_EVENTS data dictionary view displays the history of cleanup or purge events.

Column	Datatype	Null	Description
AUDIT_TRAIL	VARCHER2(28)		The audit trail that was cleaned at the time of the event: ■ STANDARD AUDIT TRAIL ■ FGA AUDIT TRAIL ■ STANDARD AND FGA AUDIT TRAIL ■ OS AUDIT TRAIL ■ XML AUDIT TRAIL ■ OS AND XML AUDIT TRAIL ■ ALL AUDIT TRAILS
RAC_INSTANCE	NUMBER	NOT NULL	Instance number indicating the Oracle RAC instance that was cleaned up at the time of the event. 0 implies "Not Applicable".
CLEANUP_TIME	TIMESTAMP(6) WITH TIME ZONE		Timestamp when the cleanup event completed
DELETE_COUNT	NUMBER		Number of audit records or audit files that were deleted at the time of the event
WAS_FORCED	VARCHAR2(3)		Indicates whether a forced cleanup occurred (YES) or (NO); forced cleanup bypasses the last archive timestamp set

14

DBMS_AUDIT_MGMT PL/SQL Package

This chapter contains:

- About Using the DBMS_AUDIT_MGMT PL/SQL Package
- DBMS_AUDIT_MGMT PL/SQL Package Security Model
- DBMS_AUDIT_MGMT PL/SQL Package Constants
- DBMS_AUDIT_MGMT PL/SQL Package Subprogram Groups
- Summary of DBMS_AUDIT_MGMT PL/SQL Package Subprograms

> **See Also:** Section 13.2 for `DBMS_AUDIT_MGMT`-specific data dictionary views

14.1 About Using the DBMS_AUDIT_MGMT PL/SQL Package

The `DBMS_AUDIT_MGMT` PL/SQL package provides a set of subprograms that you can use to manage audit trail records. You can manage the various audit trail types such as database audit trails, operating system (OS) audit trails, and XML audit trails.

The Audit Management feature is fully documented in the Oracle documentation to be released with Oracle release 11.1.0.7 and is duplicated here for Oracle Audit Vault release 10.2.3 for convenience. This `DBMS_AUDIT_MGMT` reference appendix will be removed in a future Audit Vault release.

Database auditing helps meet your database security and compliance requirements. Audit records are written to database tables, operating system (OS) files, or XML files depending on the `AUDIT_TRAIL` initialization parameter setting.

When `AUDIT_TRAIL` is set to `DB`, database records are written to the `AUD$` and `FGA_LOG$` tables in the `SYSTEM` tablespace. When `AUDIT_TRAIL` is set to OS, audit records are written to operating system files. When `AUDIT_TRAIL` is set to XML, audit records are written to operating system files in XML format.

You must manage your audit records properly in order to ensure efficient auditing and clean up.The `DBMS_AUDIT_MGMT` subprograms enable you to efficiently manage your audit trail records.

The `DBMS_AUDIT_MGMT` package provides a subprogram that allows you to move the database audit trail tables out of the `SYSTEM` tablespace. This improves overall database performance. It also allows you to dedicate an optimized tablespace for audit records.

The `DBMS_AUDIT_MGMT` subprograms also enable you to manage your operating system and XML audit records. You can define properties like the maximum size and age of an audit file. New audit files are automatically created once the maximum limits are reached.

The DBMS_AUDIT_MGMT subprograms enable you to perform cleanup operations on all audit trail types. Audit trail records can be deleted based on their last archive timestamp. The last archive timestamp indicates when the audit records were last archived.

The DBMS_AUDIT_MGMT package provides a subprogram that enables audit administrators to set the last archive timestamp for archived audit records. This subprogram can also be used by external archival systems to set the last archive timestamp.

The DBMS_AUDIT_MGMT subprograms also enable you to configure jobs that periodically delete audit trail records. The frequency with which these jobs should run can be controlled by the audit administrator.

14.2 DBMS_AUDIT_MGMT PL/SQL Package Security Model

All DBMS_AUDIT_MGMT subprograms require the user to have EXECUTE privilege over the DBMS_AUDIT_MGMT package. The SYSDBA role has EXECUTE privileges on the package by default.

Only audit administrators should have EXECUTE privileges over the DBMS_AUDIT_MGMT package.

14.3 DBMS_AUDIT_MGMT PL/SQL Package Constants

The DBMS_AUDIT_MGMT package defines several enumerated constants that should be used for specifying parameter values. Enumerated constants must be prefixed with the package name, for example, DBMS_AUDIT_MGMT.AUDIT_TRAIL_AUD_STD.

The DBMS_AUDIT_MGMT package uses the constants shown in the following tables:

- Table 14–1, " DBMS_AUDIT_MGMT Constants - Audit Trail Types"
- Table 14–2, " DBMS_AUDIT_MGMT Constants - Audit Trail Properties"
- Table 14–3, " DBMS_AUDIT_MGMT Constants - Purge Job Status"
- Table 14–4, " DBMS_AUDIT_MGMT Constants - Trace Level Values"

Audit trails can be classified based on whether audit records are written to database tables, operating system files, or XML files. Table 14–1 lists the audit trail type constants.

Table 14–1 DBMS_AUDIT_MGMT Constants - Audit Trail Types

Constant	Type	Value	Description
AUDIT_TRAIL_ALL	PLS_INTEGER	15	All audit trail types. This includes the standard database audit trail (SYS.AUD$ and SYS.FGA_LOG$ tables), operating system (OS) audit trail, and XML audit trail.
AUDIT_TRAIL_AUD_STD	PLS_INTEGER	1	Standard database audit records in the SYS.AUD$ table
AUDIT_TRAIL_DB_STD	PLS_INTEGER	3	Both standard audit (SYS.AUD$) and FGA audit(SYS.FGA_LOG$) records

Table 14–1 (Cont.) DBMS_AUDIT_MGMT Constants - Audit Trail Types

Constant	Type	Value	Description
AUDIT_TRAIL_FGA_STD	PLS_INTEGER	2	Standard database fine-grained auditing (FGA) records in the SYS.FGA_LOG$ table
AUDIT_TRAIL_FILES	PLS_INTEGER	12	Both operating system (OS) and XML audit trails
AUDIT_TRAIL_OS	PLS_INTEGER	4	Operating system audit trail. This refers to the audit records stored in operating system files.
AUDIT_TRAIL_XML	PLS_INTEGER	8	XML audit trail. This refers to the audit records stored in XML files.

Audit trail properties determine the audit configuration settings. Table 14–2 lists the constants related to audit trail properties.

Table 14–2 DBMS_AUDIT_MGMT Constants - Audit Trail Properties

Constant	Type	Value	Description
CLEAN_UP_INTERVAL	PLS_INTEGER	21	Interval, in hours, after which the cleanup job is called to clear audit records in the specified audit trail
DB_DELETE_BATCH_SIZE	PLS_INTEGER	23	Specifies the batch size to be used for deleting audit records in database audit tables. The audit records are deleted in batches of size equal to DB_DELETE_BATCH_SIZE.
OS_FILE_MAX_AGE	PLS_INTEGER	17	Specifies the maximum number of days for which an operating system (OS) or XML audit file can be kept open before a new audit file gets created
OS_FILE_MAX_SIZE	PLS_INTEGER	16	Specifies the maximum size to which an operating system (OS) or XML audit file can grow before a new file is opened

The audit trail purge job cleans the audit trail. Table 14–3 lists the constants related to purge job status values.

Table 14–3 DBMS_AUDIT_MGMT Constants - Purge Job Status

Constant	Type	Value	Description
PURGE_JOB_DISABLE	PLS_INTEGER	32	Disables a purge job
PURGE_JOB_ENABLE	PLS_INTEGER	31	Enables a purge job

The DBMS_AUDIT_MGMT package allows you to trace operations for diagnostic purposes. Table 14–4 lists the constants related to trace level values.

Table 14–4 DBMS_AUDIT_MGMT Constants - Trace Level Values

Constant	Type	Value	Description
TRACE_LEVEL_DEBUG	PLS_INTEGER	1	Logs detailed debug messages
TRACE_LEVEL_ERROR	PLS_INTEGER	2	Logs only error messages

14.4 DBMS_AUDIT_MGMT PL/SQL Package Subprogram Groups

The DBMS_AUDIT_MGMT package subprograms can be grouped into the following categories:

- Audit Trail Management Subprograms
- Audit Trail Cleanup Subprograms

14.4.1 Audit Trail Management Subprograms

Audit trail management subprograms enable you to manage audit trail properties.

Table 14–5 Audit Trail Management Subprograms

Subprogram	Description
CLEAR_AUDIT_TRAIL_PROPERTY Procedure on page 14-6	Clears the value for the audit trail property that you specify
SET_AUDIT_TRAIL_LOCATION Procedure on page 14-13	Moves the audit trail tables from their current tablespace to a user-specified tablespace
SET_AUDIT_TRAIL_PROPERTY Procedure on page 14-14	Sets the audit trail properties for the audit trail type that you specify
SET_DEBUG_LEVEL Procedure on page 14-16	Sets the trace level for the DBMS_AUDIT_MGMT package

"Summary of DBMS_AUDIT_MGMT PL/SQL Package Subprograms" on page 14-5 contains a complete listing of all subprograms in the package.

14.4.2 Audit Trail Cleanup Subprograms

Audit trail cleanup subprograms help you perform cleanup related operations on the audit trail records.

Table 14–6 Audit Trail Cleanup Subprograms

Subprogram	Description
CLEAN_AUDIT_TRAIL Procedure on page 14-6	Deletes audit trail records that have been archived
CLEAR_LAST_ARCHIVE_TIMESTAMP Procedure on page 14-8	Clears the timestamp set by the SET_LAST_ARCHIVE_TIMESTAMP procedure
CREATE_PURGE_JOB Procedure on page 14-8	Creates a purge job for periodically deleting the audit trail records
DEINIT_CLEANUP Procedure on page 14-9	Undoes the setup and initialization performed by the INIT_CLEANUP Procedure
DROP_PURGE_JOB Procedure on page 14-10	Drops the purge job created using the CREATE_PURGE_JOB procedure
GET_AUDIT_COMMIT_DELAY Function on page 14-11	Returns the Audit COMMIT Delay as the number of seconds. This is the maximum time that it takes to COMMIT an audit record to the database audit trail.
INIT_CLEANUP Procedure on page 14-11	Sets up the audit management infrastructure and sets a default cleanup interval for audit trail records
IS_CLEANUP_INITIALIZED Function on page 14-12	Checks to see if the INIT_CLEANUP procedure has been run for an audit trail type

Table 14–6 (Cont.) Audit Trail Cleanup Subprograms

Subprogram	Description
SET_LAST_ARCHIVE_TIMESTAMP Procedure on page 14-17	Sets a timestamp indicating when the audit records were last archived
SET_PURGE_JOB_INTERVAL Procedure on page 14-18	Sets the interval at which the `CLEAN_AUDIT_TRAIL` procedure is called for the purge job that you specify
SET_PURGE_JOB_STATUS Procedure on page 14-18	Enables or disables the purge job that you specify

"DBMS_AUDIT_MGMT PL/SQL Package", next, contains a complete listing of all subprograms in the package.

14.5 Summary of DBMS_AUDIT_MGMT PL/SQL Package Subprograms

Table 14–7 DBMS_AUDIT_MGMT Package Subprograms

Subprogram	Description
CLEAN_AUDIT_TRAIL Procedure on page 14-6	Deletes audit trail records that have been archived
CLEAR_AUDIT_TRAIL_PROPERTY Procedure on page 14-6	Clears the value for the audit trail property that you specify
CLEAR_LAST_ARCHIVE_TIMESTAMP Procedure on page 14-8	Clears the timestamp set by the `SET_LAST_ARCHIVE_TIMESTAMP` procedure
CREATE_PURGE_JOB Procedure on page 14-8	Creates a purge job for periodically deleting the audit trail records
DEINIT_CLEANUP Procedure on page 14-9	Undoes the setup and initialization performed by the `INIT_CLEANUP` procedure
DROP_PURGE_JOB Procedure on page 14-10	Drops the purge job created using the `CREATE_PURGE_JOB` procedure
GET_AUDIT_COMMIT_DELAY Function on page 14-11	Returns the Audit `COMMIT` Delay as the number of seconds. This is the maximum time that it takes to `COMMIT` an audit record to the database audit trail.
INIT_CLEANUP Procedure on page 14-11	Sets up the audit management infrastructure and sets a default cleanup interval for audit trail records
IS_CLEANUP_INITIALIZED Function on page 14-12	Checks to see if the `INIT_CLEANUP` procedure has been run for an audit trail type
SET_AUDIT_TRAIL_LOCATION Procedure on page 14-13	Moves the audit trail tables from their current tablespace to a user-specified tablespace
SET_AUDIT_TRAIL_PROPERTY Procedure on page 14-14	Sets the audit trail properties for the audit trail type that you specify
SET_DEBUG_LEVEL Procedure on page 14-16	Sets the trace level for the `DBMS_AUDIT_MGMT` package
SET_LAST_ARCHIVE_TIMESTAMP Procedure on page 14-17	Sets a timestamp indicating when the audit records were last archived
SET_PURGE_JOB_INTERVAL Procedure on page 14-18	Sets the interval at which the `CLEAN_AUDIT_TRAIL` is called for the purge job that you specify
SET_PURGE_JOB_STATUS Procedure on page 14-18	Enables or disables the purge job that you specify

14.5.1 CLEAN_AUDIT_TRAIL Procedure

This procedure deletes audit trail records that have been archived.

The CLEAN_AUDIT_TRAIL procedure is usually called after the SET_LAST_ARCHIVE_TIMESTAMP procedure has been used to set the last archived timestamp for the audit records.

Syntax

```
DBMS_AUDIT_MGMT.CLEAN_AUDIT_TRAIL(
   audit_trail_type         IN PLS_INTEGER,
   use_last_arch_timestamp  IN BOOLEAN DEFAULT TRUE) ;
```

Parameters

Table 14–8 CLEAN_AUDIT_TRAIL Procedure Parameters

Parameter	Description
audit_trail_type	The audit trail type for which the cleanup operation needs to be performed. Table 14–1, " DBMS_AUDIT_MGMT Constants - Audit Trail Types" on page 14-2 lists audit trail types.
use_last_arch_timestamp	Specifies whether the last archived timestamp should be used for deciding on the records that should be deleted. A value of TRUE indicates that only audit records created before the last archive timestamp should be deleted. A value of FALSE indicates that all audit records should be deleted. The default value is TRUE.

Usage Notes

None

Examples

The following example calls the CLEAN_AUDIT_TRAIL procedure to clean up the operating system (OS) audit trail records that were created before the last archive timestamp.

```
BEGIN
DBMS_AUDIT_MGMT.CLEAN_AUDIT_TRAIL(
   audit_trail_type => DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS,
   use_last_arch_timestamp => TRUE);
END;
/
```

14.5.2 CLEAR_AUDIT_TRAIL_PROPERTY Procedure

This procedure clears the value for the audit trail property that is specified. Audit trail properties are set using the SET_AUDIT_TRAIL_PROPERTY procedure.

The CLEAR_AUDIT_TRAIL_PROPERTY procedure can optionally reset the property value to it's default value through the use_default_values parameter.

Syntax

```
DBMS_AUDIT_MGMT.CLEAR_AUDIT_TRAIL_PROPERTY(
   audit_trail_type        IN PLS_INTEGER,
   audit_trail_property    IN PLS_INTEGER,
   use_default_values      IN BOOLEAN DEFAULT FALSE) ;
```

Parameters

Table 14–9 CLEAR_AUDIT_TRAIL_PROPERTY Procedure Parameters

Parameter	Description
`audit_trail_type`	The audit trail type for which the property needs to be cleared. Table 14–1, " DBMS_AUDIT_MGMT Constants - Audit Trail Types" on page 14-2 lists audit trail types.
`audit_trail_property`	The audit trail property whose value needs to be cleared. You cannot clear the value for the `CLEANUP_INTERVAL` property. Table 14–2, " DBMS_AUDIT_MGMT Constants - Audit Trail Properties" on page 14-3 lists audit trail properties.
`use_default_values`	Specifies whether the default value of the `audit_trail_property` should be used in place of the cleared value. A value of `TRUE` causes the default value of the parameter to be used. A value of `FALSE` causes the `audit_trail_property` to have no value. The default value for this parameter is `FALSE`.

Usage Notes

- You can use this procedure to clear the value for an audit trail property that you do not wish to use. For example, if you do not want a restriction on the operating system audit file size, then you can use this procedure to reset the `OS_FILE_MAX_SIZE` property.

  You can also use this procedure to reset an audit trail property to it's default value. You need to set `use_default_values` to `TRUE` when invoking the procedure.

- The `DB_DELETE_BATCH_SIZE` property needs to be individually cleared for the `AUDIT_TRAIL_AUD_STD` and `AUDIT_TRAIL_FGA_STD` audit trail types. You cannot clear this property collectively using the `AUDIT_TRAIL_DB_STD` and `AUDIT_TRAIL_ALL` audit trail types.

- You cannot clear the value for the `CLEANUP_INTERVAL` property.

Examples

The following example calls the `CLEAR_AUDIT_TRAIL_PROPERTY` procedure to clear the value for the audit trail property, `OS_FILE_MAX_SIZE`. The procedure uses a value of `FALSE` for the `USE_DEFAULT_VALUES` parameter. This means that the OS_FILE_MAX_SIZE property will no longer determine the size of the operating system (OS) audit files.

```
BEGIN
DBMS_AUDIT_MGMT.CLEAR_AUDIT_TRAIL_PROPERTY(
   AUDIT_TRAIL_TYPE        =>  DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS,
   AUDIT_TRAIL_PROPERTY    =>  DBMS_AUDIT_MGMT.OS_FILE_MAX_SIZE,
   USE_DEFAULT_VALUES      =>  FALSE );
END;
/
```

14.5.3 CLEAR_LAST_ARCHIVE_TIMESTAMP Procedure

This procedure clears the timestamp set by the SET_LAST_ARCHIVE_TIMESTAMP procedure.

Syntax

```
DBMS_AUDIT_MGMT.CLEAR_LAST_ARCHIVE_TIMESTAMP(
   audit_trail_type     IN PLS_INTEGER,
   rac_instance_number  IN PLS_INTEGER DEFAULT 0) ;
```

Parameters

Table 14–10 CLEAR_LAST_ARCHIVE_TIMESTAMP Procedure Parameters

Parameter	Description
audit_trail_type	The audit trail type for which the timestamp needs to be cleared. Table 14–1, " DBMS_AUDIT_MGMT Constants - Audit Trail Types" on page 14-2 lists audit trail types.
rac_instance_number	The instance number for the Oracle Real Application Clusters (RAC) instance. The default value is 0, which is used for the database audit trail type. The rac_instance_number is not relevant for the database audit trail type, as the database audit trail tables are shared by all RAC instances.

Usage Notes

None

Example

The following example calls the CLEAR_LAST_ARCHIVE_TIMESTAMP procedure to clear the timestamp value for the operating system (OS) audit trail type.

```
BEGIN
DBMS_AUDIT_MGMT.CLEAR_LAST_ARCHIVE_TIMESTAMP(
   audit_trail_type     =>  DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS,
   rac_instance_number  =>  1 /* single instance database */);
END;
/
```

14.5.4 CREATE_PURGE_JOB Procedure

This procedure creates a purge job for periodically deleting the audit trail records. The procedure can use the timestamp value set by the SET_LAST_ARCHIVE_TIMESTAMP procedure to decide upon the records to be deleted.

This procedure carries out the cleanup operation at intervals specified by the user. It calls the CLEAN_AUDIT_TRAIL procedure to perform the cleanup operation.

The SET_PURGE_JOB_INTERVAL procedure is used to modify the frequency of the purge job.

The SET_PURGE_JOB_STATUS procedure is used to enable or disable the purge job.

The DROP_PURGE_JOB procedure is used to drop a purge job created with the CREATE_PURGE_JOB procedure.

Syntax

```
DBMS_AUDIT_MGMT.CREATE_PURGE_JOB(
   audit_trail_type            IN PLS_INTEGER,
   audit_trail_purge_interval  IN PLS_INTEGER,
   audit_trail_purge_name      IN VARCHAR2,
   use_last_arch_timestamp     IN BOOLEAN DEFAULT TRUE) ;
```

Parameters

Table 14–11 CREATE_PURGE_JOB Procedure Parameters

Parameter	Description
`audit_trail_type`	The audit trail type for which the purge job needs to be created. Audit trail types are listed in Table 14–1, " DBMS_AUDIT_MGMT Constants - Audit Trail Types" on page 14-2 lists audit trail types.
`audit_trail_purge_interval`	The interval, in hours, at which the clean up procedure is called. A lower value means that the cleanup is performed more often.
`audit_trail_purge_name`	A name to identify the purge job.
`use_last_arch_timestamp`	Specifies whether the last archived timestamp should be used for deciding on the records that should be deleted. A value of `TRUE` indicates that only audit records created before the last archive timestamp should be deleted. A value of `FALSE` indicates that all audit records should be deleted. The default value is `TRUE`.

Usage Notes

Use this procedure to schedule the `CLEAN_AUDIT_TRAIL` procedure for your audit records.

Examples

The following example calls the `CREATE_PURGE_JOB` procedure to create a cleanup job called `CLEANUP`, for all audit trail types. It sets the `audit_trail_purge_interval` parameter to 100. This means that the cleanup job is invoked every 100 hours. It also sets the `use_last_arch_timestamp` parameter value to `TRUE`. This means that all audit records older than the last archive timestamp are deleted.

```
BEGIN
DBMS_AUDIT_MGMT.CREATE_PURGE_JOB(
  audit_trail_type => DBMS_AUDIT_MGMT.AUDIT_TRAIL_ALL,
  audit_trail_purge_interval => 100 /* hours */,
  audit_trail_purge_name => 'CLEANUP',
  use_last_arch_timestamp => TRUE);
END;
/
```

14.5.5 DEINIT_CLEANUP Procedure

This procedure undoes the setup and initialization performed by the `INIT_CLEANUP` procedure. The `DEINIT_CLEANUP` procedure clears the value of the `default_cleanup_interval` parameter. However, it does not move the audit trail tables back to their original location.

Syntax

```
DBMS_AUDIT_MGMT.DEINIT_CLEANUP(
   audit_trail_type  IN PLS_INTEGER) ;
```

Parameters

Table 14–12   DEINIT_CLEANUP Procedure Parameters

Parameter	Description
`audit_trail_type`	The audit trail type for which the procedure needs to be called. Table 14–1, " DBMS_AUDIT_MGMT Constants - Audit Trail Types" on page 14-2 lists audit trail types.

Usage Notes

You can change the `default_cleanup_interval` later using the `SET_AUDIT_TRAIL_PROPERTY` procedure.

Examples

The following example clears the `default_cleanup_interval` parameter setting for the standard database audit trail:

```
BEGIN
DBMS_AUDIT_MGMT.DEINIT_CLEANUP(
  AUDIT_TRAIL_TYPE  => DBMS_AUDIT_MGMT.AUDIT_TRAIL_AUD_STD);
END;
/
```

14.5.6 DROP_PURGE_JOB Procedure

This procedure drops the purge job created using the `CREATE_PURGE_JOB` procedure. The name of the purge job is passed as an argument.

Syntax

```
DBMS_AUDIT_MGMT.DROP_PURGE_JOB(
   audit_trail_purge_name    IN VARCHAR2) ;
```

Parameters

Table 14–13   DROP_PURGE_JOB Procedure Parameters

Parameter	Description
`audit_trail_purge_name`	The name of the purge job which is being deleted. This is the purge job name that you specified with the `CREATE_PURGE_JOB` procedure.

Usage Notes

None

Examples

The following example calls the `DROP_PURGE_JOB` procedure to drop the purge job called `CLEANUP`.

```
BEGIN
DBMS_AUDIT_MGMT.DROP_PURGE_JOB(
  AUDIT_TRAIL_PURGE_NAME  => 'CLEANUP');
END;
/
```

14.5.7 GET_AUDIT_COMMIT_DELAY Function

This function returns the Audit COMMIT Delay as the number of seconds. Audit COMMIT Delay is the maximum time that it takes to COMMIT an audit record to the database audit trail. If it takes more time to COMMIT an audit record than defined by the Audit COMMIT Delay, then the audit record is written to the operating system (OS) audit trail.

The Audit COMMIT Delay value is useful when determining the last archive timestamp for database audit records.

Syntax

```
DBMS_AUDIT_MGMT.GET_AUDIT_COMMIT_DELAY
  RETURN NUMBER;
```

Parameters

None

Usage Notes

None

Examples

None

14.5.8 INIT_CLEANUP Procedure

This procedure sets up the audit management infrastructure and a default cleanup interval for the audit trail records. The procedure also moves the audit trail tables out of the SYSTEM tablespace.

Moving the audit trail tables out of the SYSTEM tablespace enhances overall database performance. The INIT_CLEANUP procedure moves the audit trail tables to the SYSAUX tablespace. If the SET_AUDIT_TRAIL_LOCATION Procedure has already moved the audit tables elsewhere, then they are not moved back to the SYSAUX tablespace.

The SET_AUDIT_TRAIL_LOCATION Procedure enables you to specify an alternate target tablespace for the database audit tables.

The INIT_CLEANUP procedure is currently not relevant for the AUDIT_TRAIL_OS, AUDIT_TRAIL_XML, and AUDIT_TRAIL_FILES audit trail types. No preliminary set up is required for these audit trail types.

> **See Also:** Table 14–1, " DBMS_AUDIT_MGMT Constants - Audit Trail Types" on page 14-2 for a list of all audit trail types

This procedure also sets a default cleanup interval for the audit trail records.

Syntax

```
DBMS_AUDIT_MGMT.INIT_CLEANUP(
   audit_trail_type          IN PLS_INTEGER,
   default_cleanup_interval  IN PLS_INTEGER);
```

Parameters

Table 14–14 INIT_CLEANUP Procedure Parameters

Parameter	Description
audit_trail_type	The audit trail type for which the clean up operation needs to be initialized. Table 14–1, " DBMS_AUDIT_MGMT Constants - Audit Trail Types" on page 14-2 lists audit trail types.
default_cleanup_interval	The default time interval, in hours, after which the cleanup procedure should be called. The minimum value is 1 and the maximum is 999.

Usage Notes

- This procedure may involve data movement across tablespaces. This can be a resource intensive operation especially if your database audit trail tables are already populated. Oracle recommends that you invoke the procedure during non-peak hours.
- You should ensure that the SYSAUX tablespace, into which the audit trail tables are being moved, has sufficient space to accommodate the audit trail tables. You should also optimize the SYSAUX tablespace for frequent write operations.
- You can change the default_cleanup_interval later using the SET_AUDIT_TRAIL_PROPERTY procedure.

Examples

The following example calls the INIT_CLEANUP procedure to set a default_cleanup_interval of 12 hours for all audit trail types:

```
BEGIN
DBMS_AUDIT_MGMT.INIT_CLEANUP(
              audit_trail_type => DBMS_AUDIT_MGMT.AUDIT_TRAIL_ALL,
      default_cleanup_interval => 12 /* hours */);
END;
/
```

See Also: Table 14–1, " DBMS_AUDIT_MGMT Constants - Audit Trail Types" on page 14-2 for a list of all audit trail types

14.5.9 IS_CLEANUP_INITIALIZED Function

This function checks to see if the INIT_CLEANUP procedure has been run for an audit trail type. The IS_CLEANUP_INITIALIZED function returns TRUE if the procedure has already been run for the audit trail type. It returns FALSE if the procedure has not been run for the audit trail type.

This function is currently not relevant for the AUDIT_TRAIL_OS, AUDIT_TRAIL_XML, and AUDIT_TRAIL_FILES audit trail types. The function always returns TRUE for these audit trail types. No preliminary set up is required for these audit trail types.

See Also: Table 14–1, " DBMS_AUDIT_MGMT Constants - Audit Trail Types" on page 14-2 for a list of all audit trail types

Syntax

```
DBMS_AUDIT_MGMT.DEINIT_CLEANUP(
   audit_trail_type  IN PLS_INTEGER)
```

```
 RETURN BOOLEAN;
```

Parameters

Table 14–15 IS_CLEANUP_INITIALIZED Function Parameters

Parameter	Description
`audit_trail_type`	The audit trail type for which the function needs to be called. Table 14–1, " DBMS_AUDIT_MGMT Constants - Audit Trail Types" on page 14-2 lists audit trail types.

Usage Notes

None

Examples

The following example checks to see if the standard database audit trail type has been initialized for cleanup operation. If the audit trail type has not been initialized, then it calls the `INIT_CLEANUP` procedure to initialize the audit trail type.

```
BEGIN
 IF
   NOT DBMS_AUDIT_MGMT.IS_CLEANUP_INITIALIZED(DBMS_AUDIT_MGMT.AUDIT_TRAIL_AUD_STD)
 THEN
   DBMS_AUDIT_MGMT.INIT_CLEANUP(
      audit_trail_type => DBMS_AUDIT_MGMT.AUDIT_TRAIL_AUD_STD,
      default_cleanup_interval => 12 /* hours */);
 END IF;
END;
/
```

14.5.10 SET_AUDIT_TRAIL_LOCATION Procedure

This procedure moves the audit trail tables from their current tablespace to a user-specified tablespace.

The `SET_AUDIT_TRAIL_LOCATION` procedure is currently not relevant for the `AUDIT_TRAIL_OS`, `AUDIT_TRAIL_XML`, and `AUDIT_TRAIL_FILES` audit trail types. The `AUDIT_FILE_DEST` initialization parameter can be used to specify the destination directory for these audit trail types.

> **See Also:** Table 14–1, " DBMS_AUDIT_MGMT Constants - Audit Trail Types" on page 14-2 for a list of all audit trail types

Syntax

```
DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_LOCATION(
   audit_trail_type            IN PLS_INTEGER,
   audit_trail_location_value  IN VARCHAR2) ;
```

Parameters

Table 14–16 SET_AUDIT_TRAIL_LOCATION Procedure Parameters

Parameter	Description
`audit_trail_type`	The audit trail type for which the audit trail location needs to be set. Table 14–1, " DBMS_AUDIT_MGMT Constants - Audit Trail Types" on page 14-2 lists audit trail types.
`audit_trail_location_value`	The target location/tablespace for the audit trail records

Usage Notes

- This procedure involves data movement across tablespaces. This can be a resource intensive operation especially if your database audit trail tables are already populated. Oracle recommends that you invoke the procedure during non-peak hours.
- You should ensure that the target tablespace, into which the audit trail tables are being moved, has sufficient space to accommodate the audit trail tables. You should also optimize the target tablespace for frequent write operations.

Examples

The following example moves the database audit trail tables, AUD$ and FGA_LOG$, from the current tablespace to a user-created tablespace called RECORDS:

```
BEGIN
DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_LOCATION(
       audit_trail_type => DBMS_AUDIT_MGMT.AUDIT_TRAIL_DB_STD,
       audit_trail_location_value =>  'RECORDS');
END;
/
```

14.5.11 SET_AUDIT_TRAIL_PROPERTY Procedure

This procedure sets the audit trail properties for the audit trail type that is specified.

The procedure sets properties such as OS_FILE_MAX_SIZE and OS_FILE_MAX_AGE for operating system (OS) and XML audit trail types. These properties determine the maximum size and age of an audit trail file before a new audit trail file gets created.

The procedure sets properties like DB_DELETE_BATCH_SIZE and CLEANUP_INTERVAL for the database audit trail type. DB_DELETE_BATCH_SIZE specifies the batch size in which records get deleted from audit trail tables. This ensures that if a cleanup operation gets interrupted midway, the process does not need to start afresh the next time it is invoked. This is because all batches before the last processed batch are already deleted.

The CLEANUP_INTERVAL specifies the frequency, in hours, with which the cleanup procedure is called.

Syntax

```
DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_PROPERTY(
   audit_trail_type            IN PLS_INTEGER,
   audit_trail_property        IN PLS_INTEGER,
   audit_trail_property_value  IN PLS_INTEGER) ;
```

Parameters

Table 14–17 SET_AUDIT_TRAIL_PROPERTY Procedure Parameters

Parameter	Description
`audit_trail_type`	The audit trail type for which the property needs to be set. Table 14–1, " DBMS_AUDIT_MGMT Constants - Audit Trail Types" on page 14-2 lists audit trail types.
`audit_trail_property`	The audit trail property that is being set. Table 14–2, " DBMS_AUDIT_MGMT Constants - Audit Trail Properties" on page 14-3 lists audit trail properties.
`audit_trail_property_value`	The value of the property specified using `audit_trail_property`. The following are valid values for audit trail properties: ■ `OS_FILE_MAX_SIZE` can have a minimum value of 1 and maximum value of 2000000. The default value is 10000. `OS_FILE_MAX_SIZE` is measured in kilobytes (KB). ■ `OS_FILE_MAX_AGE` can have a minimum value of 1 and a maximum value of 497. The default value is 5. `OS_FILE_MAX_AGE` is measured in days. ■ `DB_DELETE_BATCH_SIZE` can have a minimum value of 100 and a maximum value of 1000000. The default value is 10000. `DB_DELETE_BATCH_SIZE` is measured as the number of audit records that are deleted in one batch. ■ `CLEANUP_INTERVAL` can have a minimum value of 1 and a maximum value of 999. The default value is set using the `INIT_CLEANUP` procedure. `CLEANUP_INTERVAL` is measured in hours.

Usage Notes

- The audit trail properties for which you do not explicitly set values use their default values.
- If you have set both the `OS_FILE_MAX_SIZE` and `OS_FILE_MAX_AGE` properties for an operating system (OS) or XML audit trail type, then a new audit trail file gets created depending on which of these two limits is reached first.

  For example, let us take a scenario where `OS_FILE_MAX_SIZE` is 10000 and `OS_FILE_MAX_AGE` is 5. If the operating system audit file is already more than 5 days old and has a size of 9000 KB, then a new audit file is opened. This is because one of the limits has been reached.
- The `DB_DELETE_BATCH_SIZE` property needs to be individually set for the `AUDIT_TRAIL_AUD_STD` and `AUDIT_TRAIL_FGA_STD` audit trail types. You cannot set this property collectively using the `AUDIT_TRAIL_DB_STD` and `AUDIT_TRAIL_ALL` audit trail types.

Examples

The following example calls the `SET_AUDIT_TRAIL_PROPERTY` procedure to set the `OS_FILE_MAX_SIZE` property for the operating system (OS) audit trail. It sets this property value to 102400. This means that a new audit file gets created every time the current audit file size reaches 100 MB.

```
BEGIN
```

```
DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_PROPERTY(
       audit_trail_type => DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS,
       audit_trail_property  =>  DBMS_AUDIT_MGMT.OS_FILE_MAX_SIZE,
       audit_trail_property_value =>  102400 /* 100MB*/ );
END;
/
```

The following example calls the SET_AUDIT_TRAIL_PROPERTY procedure to set the OS_FILE_MAX_AGE property for the operating system (OS) audit trail. It sets this property value to 5. This means that a new audit file gets created every sixth day.

```
BEGIN
DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_PROPERTY(
       audit_trail_type => DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS,
       audit_trail_property  =>  DBMS_AUDIT_MGMT.OS_FILE_MAX_AGE,
       audit_trail_property_value  =>  5 /* days */);
END;
/
```

The following example calls the SET_AUDIT_TRAIL_PROPERTY procedure to set the DB_DELETE_BATCH_SIZE property for the AUDIT_TRAIL_AUD_STD audit trail. It sets this property value to 100000. This means that during a cleanup operation, audit records are deleted from the SYS.AUD$ table in batches of size 100000.

```
BEGIN
DBMS_AUDIT_MGMT.SET_AUDIT_TRAIL_PROPERTY(
       audit_trail_type => DBMS_AUDIT_MGMT.AUDIT_TRAIL_AUD_STD,
       audit_trail_property => DBMS_AUDIT_MGMT.DB_DELETE_BATCH_SIZE,
       audit_trail_property_value => 100000 /* delete batch size */);
END;
/
```

14.5.12 SET_DEBUG_LEVEL Procedure

This procedure sets the trace level for the DBMS_AUDIT_MGMT package. The default trace level, TRACE_LEVEL_ERROR, logs only the error messages as trace messages. The debug trace level, TRACE_LEVEL_DEBUG, logs detailed debug messages.

Syntax

```
DBMS_AUDIT_MGMT.SET_DEBUG_LEVEL(
   debug_level IN PLS_INTEGER DEFAULT TRACE_LEVEL_ERROR);
```

Parameters

Table 14–18 SET_DEBUG_LEVEL Procedure Parameters

Parameter	Description
debug_level	The trace level to set. TRACE_LEVEL_ERROR logs only the error messages as trace messages. TRACE_LEVEL_DEBUG logs detailed debug messages.

Usage Notes

None

Examples

The following example calls the SET_DEBUG_LEVEL procedure to enable enhanced debugging.

```
BEGIN
DBMS_AUDIT_MGMT.SET_DEBUG_LEVEL(
  debug_level    => DBMS_AUDIT_MGMT.TRACE_LEVEL_DEBUG);
END;
/
```

14.5.13 SET_LAST_ARCHIVE_TIMESTAMP Procedure

This procedure sets a timestamp indicating when the audit records were last archived. The audit administrator provides the timestamp to be attached to the audit records. The CLEAN_AUDIT_TRAIL procedure uses this timestamp to decide on the audit records to be deleted.

Syntax

```
DBMS_AUDIT_MGMT.SET_LAST_ARCHIVE_TIMESTAMP(
   audit_trail_type     IN PLS_INTEGER,
   last_archive_time    IN TIMESTAMP,
   rac_instance_number  IN PLS_INTEGER DEFAULT 0) ;
```

Parameters

Table 14–19 SET_LAST_ARCHIVE_TIMESTAMP Procedure Parameters

Parameter	Description
audit_trail_type	The audit trail type for which the timestamp needs to be set. Table 14–1, " DBMS_AUDIT_MGMT Constants - Audit Trail Types" on page 14-2 lists audit trail types.
last_archive_time	The TIMESTAMP value to be attached to the audit records. This indicates the last time when the audit records were archived.
rac_instance_number	The instance number for the Oracle Real Application Clusters (RAC) instance.The default value is 0, which is used for the database audit trail type. The rac_instance_number is not relevant for the database audit trail type, as the database audit trail tables are shared by all RAC instances.

Usage Notes

- The last_archive_time must be specified in Coordinated Universal Time (UTC) when the audit trail types are AUDIT_TRAIL_AUD_STD or AUDIT_TRAIL_FGA_STD. This is because the database audit trails store the timestamps in UTC. UTC is also known as Greenwich Mean Time (GMT).
- The last_archive_time must be specified as the local timezone time when the audit trail types are AUDIT_TRAIL_OS or AUDIT_TRAIL_XML. This is because the operating system audit records are stored as files that use the local timezone for their last modification timestamps.
- When using an Oracle Real Application Clusters (RAC) database, Oracle recommends that you use the Network Time Protocol (NTP) to synchronize individual RAC nodes.

Examples

The following example calls the SET_LAST_ARCHIVE_TIMESTAMP procedure to set the last archive timestamp for the operating system (OS) audit trail type. It uses the TO_TIMESTAMP function to convert a character string into a timestamp value.

```
BEGIN
DBMS_AUDIT_MGMT.SET_LAST_ARCHIVE_TIMESTAMP(
   audit_trail_type => DBMS_AUDIT_MGMT.AUDIT_TRAIL_OS,
   last_archive_time => TO_
TIMESTAMP('10-SEP-0714:10:10.0','DD-MON-RRHH24:MI:SS.FF'),
   rac_instance_number => 1 /* single instance database */);
END;
/
```

14.5.14 SET_PURGE_JOB_INTERVAL Procedure

This procedure sets the interval at which the CLEAN_AUDIT_TRAIL procedure is called for the purge job specified. The purge job must have already been created using the CREATE_PURGE_JOB procedure.

Syntax

```
DBMS_AUDIT_MGMT.SET_PURGE_JOB_INTERVAL(
   audit_trail_purge_name      IN VARCHAR2,
   audit_trail_interval_value  IN PLS_INTEGER) ;
```

Parameters

Table 14–20 SET_PURGE_JOB_INTERVAL Procedure Parameters

Parameter	Description
audit_trail_purge_name	The name of the purge job for which the interval is being set. This is the purge job name that you specified with the CREATE_PURGE_JOB procedure.
audit_trail_interval_value	The interval, in hours, at which the clean up procedure should be called. This value modifies the audit_trail_purge_interval parameter set using the CREATE_PURGE_JOB procedure

Usage Notes

Use this procedure to modify the audit_trail_purge_interval parameter set using the CREATE_PURGE_JOB procedure.

Examples

The following example calls the SET_PURGE_JOB_INTERVAL procedure to change the frequency at which the purge job called CLEANUP is invoked. The new interval is set to 24 hours.

```
BEGIN
DBMS_AUDIT_MGMT.SET_PURGE_JOB_INTERVAL(
  AUDIT_TRAIL_PURGE_NAME       => 'CLEANUP',
  AUDIT_TRAIL_INTERVAL_VALUE   => 24 );
END;
/
```

14.5.15 SET_PURGE_JOB_STATUS Procedure

This procedure enables or disables the specified purge job. The purge job must have already been created using the CREATE_PURGE_JOB procedure.

Syntax

```
DBMS_AUDIT_MGMT.SET_PURGE_JOB_STATUS(
   audit_trail_purge_name    IN VARCHAR2,
   audit_trail_status_value  IN PLS_INTEGER) ;
```

Parameters

Table 14–21 SET_PURGE_JOB_STATUS Procedure Parameters

Parameter	Description
`audit_trail_purge_name`	The name of the purge job for which the status is being set. This is the purge job name that you specified with the `CREATE_PURGE_JOB` procedure.
`audit_trail_status_value`	One of the values specified in Table 14–3, " DBMS_AUDIT_ MGMT Constants - Purge Job Status" on page 14-3. The value `PURGE_JOB_ENABLE` enables the specified purge job. The value `PURGE_JOB_DISABLE` disables the specified purge job.

Usage Notes

None

Examples

The following example calls the `SET_PURGE_JOB_STATUS` procedure to enable the `CLEANUP` purge job.

```
BEGIN
DBMS_AUDIT_MGMT.SET_PURGE_JOB_STATUS(
  audit_trail_purge_name      => 'CLEANUP',
  audit_trail_status_value    => DBMS_AUDIT_MGMT.PURGE_JOB_ENABLE);
END;
/
```

A

Troubleshooting an Audit Vault System

This appendix contains:

- Location of Audit Vault Server Log and Error Files
- Location of Audit Vault Collection Agent Log and Error Files
- Troubleshooting Tips

A.1 Location of Audit Vault Server Log and Error Files

Table A–1 shows the names and a description of the Audit Vault Server log and error files located in the Audit Vault Server `$ORACLE_HOME/av/log` directory. These files contain important information regarding the return status of commands and operations that will be useful in diagnosing problems should they occur. Log files can be deleted at any time, except for the `avca.log` file, which can only be deleted when the Audit Vault Server is shut down.

Table A–1 Name and Description of Audit Vault Server Log and Error Files

File Name	Description
`agent.err`	Contains a log of errors encountered in collection agent initialization. This file can be deleted at any time.
`agent.out`	Contains a log of all primary collection agent-related operations and activity. This file can be deleted at any time.
`avca.log`	Contains a log of all `AVCA` commands that have been run and the results of running each command. This file can only be deleted after Audit Vault Server is shut down.
`av_client-%`*`g`*`.log.`*`n`*	Contains a log of the collection agent operations and any errors returned from those operations. The `%`*`g`* is a generation number that starts from 0 (zero) and increases once the file size reaches the 10 MB limit. A concurrent existence of this file is indicated by a `.`*`n`* suffix appended to the file type name, such as `av_client-%`*`g`*`.log.`*`n`*, where *`n`* is an integer issued in sequence, for example, `av_client-0.log.1`. This file can be deleted at any time.

Table A–1 (Cont.) Name and Description of Audit Vault Server Log and Error Files

File Name	Description
avorcldb.log	Contains a log of all avorcldb commands that have been run and the results of running each command. This file can be deleted at any time.
MSSQLDB-%g.log	Contains a log of all avmssqldb commands that have been run and the results of running each command. This file can be deleted at any time. The *%g* is a generation number that starts from 0 (zero) and increases once the file size reaches the 100 MB limit. To enable detailed logging of avmssqldb commands, you must restart av on the Audit Vault Server side (avctl stop_av, avctl start_av) with the log level set to debug.
SYBDB-%g.log	Contains a log of all avsybdb commands that have been run and the results of running each command. This file can be deleted at any time. The *%g* is a generation number that starts from 0 (zero) and increases once the file size reaches the 100 MB limit. To enable detailed logging of avsybdb commands, you must restart av on the Audit Vault Server side (avctl stop_av, avctl start_av) with the log level set to debug.

If you, as the Audit Vault Administrator, need to do Audit Vault Console troubleshooting, you must enable Enterprise Manager logging. You must modify the following emomslogging.properties file in the Audit Vault Server home: $ORACLE_HOME/sysman/config/emomslogging.properties on Linux or UNIX systems or ORACLE_HOME\sysman\config\emomslogging.properties on Windows systems and add the following lines of information:

```
log4j.appender.avAppender=org.apache.log4j.RollingFileAppender
log4j.appender.avAppender.File=<$ORACLE_HOME>/oc4j/j2ee/OC4J_DBConsole__/log/av-application.log
log4j.appender.avAppender.Append=true
log4j.appender.avAppender.MaxFileSize =20000000
log4j.appender.avAppender.Threshold = DEBUG
log4j.appender.avAppender.layout=org.apache.log4j.PatternLayout
log4j.appender.avAppender.layout.ConversionPattern=%d [%t] %-5p %c{2} %M.%L - %m\n
log4j.category.oracle =DEBUG, avAppender
```

This information can be used to debug communication issues between the server and the collection agents.

A.2 Location of Audit Vault Collection Agent Log and Error Files

Table A–2 shows the names and a description of the Audit Vault collection agent log and error files located in the Audit Vault collection agent $ORACLE_HOME/av/log directory. These files contain important information regarding the return status of commands and operations that will be useful in diagnosing problems should they occur.

Table A–2 Name and Description of Audit Vault Collection Agent Log and Error Files

File Name	Description
agent.err	Contains a log of all errors encountered in collection agent initialization and operation. This file can be deleted at any time.
agent.out	Contains a log of all primary collection agent-related operations and activity. This file can be deleted at any time.
avca.log	Contains a log of all AVCA commands that have been run and the results of running each command. This file can be deleted at any time.

Table A–2 (Cont.) Name and Description of Audit Vault Collection Agent Log and Error Files

File Name	Description
avorcldb.log	Contains a log of all AVORCLDB commands that have been run and the results of running each command. This file can be deleted at any time.
<collector-name>_<source-name>_<source-id>.log	Contains a log of collection operations for the DBAUD, OSAUD, MSSQLDB, and SYBDB collectors. This file can only be deleted after OC4J is shut down. To increase the log level, you must restart OC4J on the collection agent side with the appropriate debug level.
agent_client-%*g*.log.*n*	Contains a log of the collection agent operations and any errors returned from those operations. The %*g* is a generation number that starts from 0 (zero) and increases once the file size reaches the 10 MB limit. A concurrent existence of this file is indicated by a .*n* suffix appended to the file type name, such as av_client-%*g*.log.*n*, where *n* is an integer issued in sequence, for example, av_client-0.log.1. This file can be deleted at any time.
MSSQLDB-%g.log	Contains a log of all avmssqldb commands that have been run and the results of running each command. This file can be deleted at any time. The %*g* is a generation number that starts from 0 (zero) and increases once the file size reaches the 100 MB limit. To enable detailed logging of avmssqldb commands, you must restart OC4J on the collection agent side (avctl stop_oc4j, avctl start_oc4j) with the log level set to debug.
SYBDB-%g.log	Contains a log of all avsybdb commands that have been run and the results of running each command. This file can be deleted at any time. The %*g* is a generation number that starts from 0 (zero) and increases once the file size reaches the 100 MB limit. To enable detailed logging of avsybdb commands, you must restart OC4J on the collection agent side (avctl stop_oc4j, avctl start_oc4j) with the log level set to debug.
sqlnet.log	Contains a log of SQL*Net information.

The directory *Audit_Vault_Agent_Home*/oc4j/j2ee/home/log contains the logs generated by the collection agent OC4J. In this directory, the file AVAgent-access.log contains a log of requests the collection agent receives from the Audit Vault Server. This information can be used to debug communication issues between the server and the collection agent.

Failed configuration commands are located in the Audit Vault collection agent $ORACLE_HOME/cfgtoollogs directory, which includes the file, configToolFailedCommands. This file contains just the name of the failed command. See the avca.log or avorcldb.log file for additional information, including any associated errors and error messages.

A.3 Troubleshooting Tips

This section describes a number of troubleshooting scenarios that you might encounter with some of the Audit Vault components and how try to resolve each one. The scenarios are placed in the following groupings:

- Audit Vault Server
- Audit Vault Collection Agent
- Audit Vault Collector

- Oracle Audit Vault Console
- Audit Vault in an Oracle Real Application Clusters (Oracle RAC) Environment

A.3.1 Audit Vault Server

This section describes Audit Vault Server problems that you might encounter.

Problem: Best way to tune Audit Vault Server performance when using the REDO collector.

Following an Audit Vault Server installation, the `streams_pool_size` initialization parameter is set to 150 MB. This parameter must be tuned to maximize REDO collector performance if you are going to be using this collector. In an Oracle Real Application Clusters (Oracle RAC) environment, this parameter must be tuned on all nodes because it is uncertain where the queue will be particularly after an instance startup.

Solution:

Typically, once a REDO collector is configured and started, let it run for a while. This will allow the autotuning feature of Oracle Database to allocate memory for the best database performance for the `streams_pool_size` parameter. Using AWR, check to see if STREAMS AQ has a flow control issue – enqueue being blocked. In the event that you notice that the performance, for example, is only 500 records being applied per second, it may become necessary to manually tune this parameter.

Assuming that you have at least 1 GB of physical memory in your Audit Vault Server system, set this parameter to 200 MB using the SQL command `ALTER SYSTEM SET STREAMS_POOL_SIZE=200;`. Monitor the performance again using AWR. You should achieve a record apply rate of 2000 records per second, which is a typical maximum rate for the REDO collector. Usually, setting the value to 200 MB should be sufficient. If you are using Oracle Audit Vault in an Oracle RAC environment, set this parameter value accordingly on all nodes in the cluster. Use the SQL command `ALTER SYSTEM SET STREAMS_POOL_SIZE=200 SID=av`*`n`*`;`, where *`n`* is the number portion of the SID for each node in the cluster, for example, `av2`, `av3`, `av4`, and so on, if that is your naming convention.

A.3.2 Audit Vault Collection Agent

This section describes Audit Vault collection agent problems that you might encounter.

Problem: Audit Vault Agent Status is Blank on the Windows Services Panel

After installing Audit Vault Agent for Windows (32-bit), configuring a source and collectors, then starting the agent on the Audit Vault Server side, a check of the Services Panel on the Windows system where the Audit Vault Agent resides shows that the status is blank, rather than Started.

Solution:

This is normal behavior for the Audit Vault Agent on Windows systems because the service is a short-lived process. Once the Agent service process completes its task, it exits, so the status of the service will not show as "Started", however, the Audit Vault Agent is running fine.

You can run the AVCTL `show_agent_status` command to check the status of the Audit Vault Agent. For example, on a Windows system:

```
C:\>avctl show_agent_status -agentname agent1
AVCTL started
```

```
Getting agent metrics...
--------------------------------
Agent is running
--------------------------------
Metrics retrieved successfully.
```

Problem: Need to debug a collection agent problem

In trying to diagnose an Audit Vault collection agent problem, it would be nice to be able to turn on debug logging.

Solution:

Run the following set of AVCTL commands on the command-line:

```
avctl stop_oc4j
avctl start_oc4j -loglevel debug
```

Then check the log output in the Audit Vault Agent `Oracle_home/av/log` directory on Linux and UNIX systems or in the `Oracle_home\av\log` directory on Windows systems.

Turning on debug logging creates more logging and writing overhead, so be sure to turn off debug logging when you are ready to do so by performing the following `AVCTL` commands on the command-line:

```
avctl stop_oc4j
avctl start_oc4j
```

See the `avctl stop_oc4j` and `start_oc4j` commands for more information.

Problem: The Agent OC4J or Audit Vault Console OC4J fails to start

After issuing an `avctlstart_oc4j` command, an `avctl show_oc4j_status` command shows that OC4J is not running. Or, after issuing an `avctl start_av` command, an `avctl show_av_status` command shows that OC4J is not running.

Solution:

Go to `$ORACLE_HOME/av/log/agent.err` log file to see what error message appears in the log.

Or, go to `$ORACLE_HOME/oc4j/j2ee/home` and issue the following command to see what error message appears on the console:

```
java -jar oc4j.jar
```

This problem is most likely caused by a port conflict. For example, if the problem is caused by an RMI port conflict, you would see the following message in the console:

```
D:\oracle\product\10.2.3\avagentrc3_01\oc4j\j2ee\home>java -jar oc4j.jar

08/05/16 10:39:51 Error starting ORMI-Server.  Unable to bind socket: Address
already in use: JVM_Bind
```

Three ports are needed to start OC4J or Audit Vault Console OC4J: RMI, JMS, and HTTP. A port conflict with any of these ports can cause the agent OC4J or Audit Vault Console OC4J to fail to start or the agent service of Audit Vault Console to become unavailable. If there is a port conflict with any of these ports, each of these ports can be modified in the following files at `$ORACLE_HOME/oc4j/j2ee/config` by selecting a port number not in use:

- rmi.xml
- jms.xml
- http-web-site.xml or (av-agent-web-site.xml)

Problem: The setup command returned an error message that the connection to the source database using the credentials in the wallet was not successful

This problem is most likely due to entering an incorrect user name or password or both when issuing the setup command using either the AVORCLDB, AVMSSQLDB, or AVSYBDB command-line utility.

Solution:

Reissue the setup command again using the correct credentials.

A.3.3 Audit Vault Collector

This section describes Audit Vault collector problems that you might encounter.

Problem: Cannot start the DBAUD collector and the log file shows an error

The DBAUD Collector log file (in the Audit Vault collection agent home) shows the following entry:

```
INFO @ '17/08/2007 15:05:48 02:00':
Could not call Listener, NS error 12541, 12560, 511, 2, 0
```

Solution:

In configuring the source and collectors, the last step can be overlooked. This is in Section 2.3.6 about running the avorcldb setup command in the Audit Vault collection agent home. Overlooking this step prevents the DBAUD collector from starting.

To verify that this is the problem, set your environment variables for the Audit Vault collection agent shell (ORACLE_HOME, PATH, and LD_LIBRARY_PATH).

Change directories to the network/admin directory:

Perform the cat command on your tnsnames.ora file. There should be an entry something like SRCDB1. If there is no SRCDB1 entry in your tnsnames.ora file, run the avorcldb setup command as shown in Section 2.3.6.

Next, try to connect to the source database with the following command:

```
sqlplus /@SRCDB1
```

If the connection is successful, then your source database is set up correctly. Try starting the DBAUD collector (avctl start_colletor command).

Problem: Not sure if the DBAUD_Collector or OSAUD_Collector collectors are collecting from the AUD$ table and the OS file, respectively

After you set up both the DBAUD_Collector and OSAUD_Collector collectors, you want to check to see that they are collecting from the AUD$ table and OS file, respectively.

Solution:

To see if DBAUD_Collector is collecting from the AUD$ table, check the contents of the `DBAUD_Collector_<source-name_prefix><source-id>.log` file in the Audit Vault collection agent home `/av/log` directory.

To see if OSAUD_Collector is collecting from the OS File, check the contents of the `orcldb_osaud_<source name>.log` file in the Audit Vault collection agent home `/av/log` directory.

Bring each file into an editor and search for entries that indicate that the collector is collecting audit records.

For example, entries like these would be found in the DBAUD_Collector log file:

```
     ***** Started logging for 'AUD$ Audit Collector' *****
.
.
.
INFO @ '25/01/2007 19:08:42 -8:00':
     ***** SRC connected OK

INFO @ '25/01/2007 19:08:53 -8:00':
     ***** SRC data retireved OK
.
.
.
```

For example, an entry like this would be found in the OSAUD_Collector log file:

```
File opened for logging source "DBS1.REGRESS.RDBMS.DEV.US.ORACLE.COM"
INFO @ '24/01/2007 18:16:18 -8:00':
***** Started logging for 'OS Audit Collector' *****
```

If everything looks correct, close the editor, then refresh the warehouse using the `avctl refresh_warehouse` command in the Audit Vault Server shell. When this operation completes, log in to the Audit Vault Console as the Audit Vault auditor and examine the graphical summary named **Activity by Audit Event Category** on the **Overview** page for the appearance of additional audit records in the various event categories. Increased counts for the various event categories indicate that these collectors are collecting audit records.

Problem: ORA-01017:invalid username/password; logon denied error when starting up the DBAUD_Collector or setting up the REDO_Collector

When you try to start up the DBAUD_Collector or set up the REDO_Collector, you get an ORA-01017: invalid username/password; logon denied error.

Solution:

This error is likely due to a problem with your user name or your password or both in the password file as well as a problem with the wallet. Try re-creating the user name and password. If the problem persists, re-create the password file. If this does not fix the problem, add the source user to the wallet again using the `avorcldb setup` command. Ensure that it is the same user name and password that you are using on the source database.

Problem: Collector log for MSSQLDB collector or SYBDB collector indicates a jar file is missing

When either JDBC Driver (`sqljdbc.jar` or `jconn3.jar`) for the SQL Server or Sybase ASE source database, respectively, cannot be found in the *`Collector Agent`* *home*/jlib directory, this error will appear in the collector log of the respective collector being used. Under other circumstances, such as when using either the AVMSSQLDB or AVSYBDB command-line utilities, the following error is returned when the JDBC Driver is not located in this directory:

```
SQLException3, "JDBC Driver is missing. Please make sure that the JDBC jar exists
in the location specified in Audit Vault documentation."
```

Solution:

See Section 2.4.1 for information about the `sqljdbc.jar` (JDBC Driver) for the Microsoft SQL Server source database and Section 2.6.1 for information about the `jconn3.jar` (JDBC Driver) for Sybase ASE source database. Once these JDBC Drivers are in place, you must restart OC4J. See Section 7.16 and Section 7.12 for more information.

Problem: Unable to connect to source database

When trying to verify either the, ORCLDB, MSSQLDB, SYBDB, or DB2DB collector using the verify command, you may be returned the following error "Unable to connect to source database".

Solution:

This error can be returned if the source user you specified in the verify command for either the Oracle Database source, SQL Server source database, or Sybase ASE source database does not have sufficient privileges to connect to the source database. Check and see if the specified source user has sufficient privileges to connect to the respective database. See Section 2.3.2 for information about creating and granting an Oracle Database source user sufficient privileges to access the database. See Section 2.4.2 for information about creating and granting a SQL Server database source user sufficient privileges to access the database. See Section 2.6.2 for information about creating and granting a Sybase ASE database source user sufficient privileges to access the database.

A.3.4 Oracle Audit Vault Console

This section describes Audit Vault Console problems that you might encounter.

Problem: Audit Vault Console does not come up in the Web browser

When you try to bring up the Audit Vault Console in a Web browser, it appears to hang, or after a while it times out.

Solution:

This may be happening because Audit Vault Console is down. To check the status of Audit Vault Console, issue an `avctl show_av_status` command in the Audit Vault Server shell. If the status indicates that the Audit Vault Console is down, issue the `avctl start_av` command in the Audit Vault Server shell to get it started again. Then start up the Audit Vault Console in the Web browser. The Audit Vault Console should appear and let you log in to the Audit Vault auditor's or administrator's management system.

Problem: Need to debug an Audit Vault Console problem

In trying to diagnose an Audit Vault Console problem on the Audit Vault Server, it would be nice to be able to turn on debug logging.

Solution:

This can be done by performing the following set of AVCTL commands on the command-line:

```
avctl stop_av
avctl start_av -loglevel debug
```

Then check the log output in the Audit Vault Server Oracle_home/av/log directory on Linux and UNIX systems or in the Oracle_home\av\log directory on Windows systems.

Turning on debug logging will degrade performance, so be sure to turn off debug logging when you are ready to do so by performing the following set of AVCTL commands on the command-line:

```
avctl stop_av
avctl start_av
```

See the avctl stop_av and start_av commands for more information.

A.3.5 Audit Vault in an Oracle Real Application Clusters (Oracle RAC) Environment

This section describes some problems that you might encounter when you run Audit Vault in an Oracle Real Application Clusters (Oracle RAC) environment.

Problem: In an Oracle RAC environment, the AVCA drop_agent operation fails with an error when this command is issued from one of the Oracle RAC nodes

When you try to issue an AVCA add_agent command from one of the Oracle RAC nodes, the command fails.

Solution:

In an Oracle RAC environment, AVCA commands must be issued from the node on which Oracle Enterprise Manager resides. This is the same node on which the av.ear file is deployed.

In an Oracle RAC environment, AVCA and AVCTL commands can be issued only from the node where the av.ear file is deployed.

To see where the av.ear file is deployed, check to see where the following file is located: $ORACLE_HOME/oc4j/j2ee/oc4j_applications/applications/av/av/WEB-INF/classes/av.properties

Once you locate the node, run all AVCA and AVCTL commands from that node.

If the node on which the av.ear file is deployed is down, deploy the av.ear file to another node using the avca deploy_av command. The command syntax is as follows:

```
deploy_av -sid <sid> -dbalias <db alias>
          -avconsoleport <av console port>
```

In this example:

- -sid <sid> is the Oracle system identifier (SID) for the instance.
- -dbalias <db alias> is the database alias.
- -avconsoleport <av console port> is the port number for the Audit Vault Console.

Note that when the avca deploy_av command is issued, a wallet containing the default avadmin entries is also created on the other node. However, other entries, such as the source user credentials must be added to the wallet using the setup command for the command-line interface (AVORCLDB, AVMSSQLDB, or AVSYBDB) being used that matches the collectors that are in use.

To use the Audit Vault Console from this other node, enter its host name or IP address (<host>) and port number (<port>) as you did previously in the Address field of the browser window (http://<host>:<port>/av), but replace the original host name or IP address with that for the other node.

B

Audit Vault Error Messages

The following sections describe the Oracle Audit Vault error messages:

- Audit Vault Server Error Messages
- Audit Vault Client Error Messages

B.1 Audit Vault Server Error Messages

This section describes the Audit Vault Server-side error message codes.

B.1.1 Generic Error Codes

This section describes the generic error codes.

46501, invalid %s

Cause: Invalid value specified.

Action: Provide a valid non-NULL value with a valid length.

46502, NULL in %s

Cause: NULL value specified.

Action: Provide a non-NULL value.

46503, object %s already exists

Cause: Object specified was already present in the system.

Action: Provide a different value.

46504, duplicate %s

Cause: Value was repeated in the input.

Action: Remove the duplicates.

46505, object %s does not exist

Cause: Object specified was not present in the system.

Action: Provide a different value.

46506, attribute %s exists in %s

Cause: Attribute specified was already present.

Action: Provide a different attribute.

46507, invalid data or type name for attribute %s

Cause: Data type of the value specified was different from the type name of the attribute.

Action: Change the type name or the type of the value for the attribute.

46508, too many attributes of type %s specified

Cause: Specified number of attributes of this type exceeded the maximum number supported.

Action: Specify fewer number of attributes of this type.

B.1.2 Source and Event Error Codes

This section describes the source and event error codes.

46521, NULL value passed for a mandatory attribute

Cause: A mandatory attribute was set to a NULL value.

Action: Provide a non-NULL value for the mandatory attribute.

46522, mandatory attribute %s missing in the input

Cause: Mandatory attribute name was missing in the attribute value list.

Action: Provide the value for mandatory attribute.

46523, attempting to drop Event Category with active Events

Cause: Event Category specified had active Events.

Action: Drop the active Events before dropping this Event Category.

46524, active Collectors exist for the Source

Cause: Source specified had Collectors which were active.

Action: Drop active Collectors for the given Source.

46525, Sourcetype-specific extension for Category already exists

Cause: Event Category was specified which already has a Format extension for the given Sourcetype.

Action: Provide an Event Category which does not have a Sourcetype-specific extension.

46526, attempting to drop an in-use Event mapping

Cause: Event mapping specified was in use.

Action: Provide an Event mapping that is not being used.

46527, attempting to change an immutable attribute

Cause: An immutable attribute was specified.

Action: Provide a mutable attribute.

46528, attempting to drop system-defined Event

Cause: Event specified was system-defined.

Action: Provide a user-defined Event.

46529, attempting to drop Event with active mappings

Cause: Event specified had active Event mappings.

Action: Drop the active mappings before dropping this Event.

46530, attempting to drop Sourcetype with active Sources

Cause: Sourcetype specified had active Sources.

Action: Drop the active Sources before dropping this Sourcetype.

46531, unsupported Source version

Cause: Version specified for the Source was not supported.

Action: Provide a Source version which is equal to or greater than the minimum supported version for the corresponding Sourcetype.

B.1.3 Collector Error Codes

This section describes the collector error codes.

46541, attempting to drop Collector Type with active Collectors

Cause: One or more Collectors for this Collector Type were active.

Action: Drop all active Collectors for this Collector Type.

46542, attempting to drop an Agent with active Collectors

Cause: One or more Collectors for this Agent were active.

Action: Drop all active Collectors for this Agent.

46543, attempting to drop a Collector before disabling the collection

Cause: The collection for the Collector specified was not disabled.

Action: Disable the collection before dropping the Collector.

46544, attempting to drop an Agent before disabling it

Cause: The Agent specified was not disabled.

Action: Disable the Agent before dropping it.

B.1.4 Attribute Definition Error Codes

This section describes the attribute definition error codes.

46551, attempting to change the type of an attribute currently in use

Cause: Attribute specified was in use.

Action: Provide an attribute that is not being used.

46552, attempting to drop an attribute currently in use

Cause: Attribute specified was in use.

Action: Provide an attribute that is not being used.

46553, attempting to change the type of an attribute without providing a new default value

Cause: Current type of the default value did not match with the new type specified.

Action: Provide a new default value for the attribute.

B.1.5 Alert Error Codes

This section describes the alert error codes.

46561, no Format defined for the Source Type and Category

Cause: Format for the specified Source Type and Category pair was not present in the system.

Action: Provide Source Type and Category pair which already has a Format defined.

46562, error in Alert condition

Cause: Invalid Alert condition was specified.

Action: Correct the Alert condition.

46563, attempting to drop a nonuser-defined Alert

Cause: Nonuser-defined Alert was specified.

Action: Provide a user-defined Alert.

46599, Internal error %s

Cause: Internal error occurred in Audit Vault.

Action: Contact Oracle Support Services.

B.1.6 Server-Side Audit Service Error Messages

This section describes the server-side audit service error codes.

46601, The authenticated user is not authorized with audit source

Cause: User is not authorized to send audit data on behalf of this audit source.

Action: Connect as the user who is associated with the source. Or grant this user appropriate authorization by changing the source's properties.

46602, Error on audit record insert as RADS partition full

Cause: RADS partition table is full.

Action: Purge the RADS partition table through archive.

46603, Error on audit record insert as RADS_INVALID table full

Cause: `RADS_INVALID` table is full.

Action: Need to purge `RADS_INVALID` table or make its size larger.

46604, Error on insert as Error table full

Cause: Error table is full.

Action: Need to purge the error table.

46605, There are more recovery entries than the maximum member can be returned

Cause: There are more recovery entries for this collector.

Action: Need to purge the old entries from the recovery table.

46606, There is no recovery entry for the given name

Cause: There was no recovery context matching to the given name.

Action: Need to check if the name was correct or if the recovery context was saved for this name.

46607, There are more configuration entries than the maximum member can be returned

Cause: There were more configuration entries for this collector.

Action: Need to reduce the configuration entries for this collector.

B.1.7 Data Warehouse Error Messages

This section describes messages from the data warehouse.

46620, invalid interval %s for data warehouse duration; must be positive

Cause: Invalid interval was specified for data warehouse duration.

Action: Specify valid interval, the interval should be positive.

46621, invalid start date %s for data warehouse operation; must be less than %s

Cause: Invalid start date was specified for data warehouse load/purge operation.

Action: Specify valid start date, the start date must be less than current date - warehouse duration.

46622, invalid number of days %s for data warehouse operation; must be greater than 0

Cause: Invalid number of days was specified for data warehouse load/purge operation.

Action: Specify valid number of days, the number of days must be positive

46623, cannot execute warehouse operation; another operation is currently running

Cause: A warehouse operation was executed while another operation is currently running.

Action: Wait for the operation to complete before reissuing the command.

46624, invalid schedule %s for data warehouse refresh schedule

Cause: Invalid schedule was specified for data warehouse refresh.

Action: Specify valid non-null schedule.

46625, invalid repeat interval %s for data warehouse refresh schedule

Cause: Invalid schedule was specified for data warehouse refresh.

Action: Specify valid non-null repeat interval.

B.1.8 Other Audit Vault Policy Error Messages

This section describes Oracle Audit Vault policy error messages.

46640, specified source name %s was not found

Cause: Invalid source name was specified.

Action: Specify a valid source name.

46641, archive does not exist

Cause: Invalid archive id was specified.

Action: Specify valid archive ID.

46642, database audit type invalid

Cause: Invalid database audit type specified.

Action: Database audit type must be S for standard or F for FGA.

46643, audit frequency invalid

Cause: Invalid audit frequency specified.

Action: Audit frequency must be A for "by access" or S for "by session".

46644, return type invalid

Cause: Return type was invalid.

Action: Return type must be S for "success", F for "failure", or B for "both".

46645, privilege flag invalid

Cause: Privilege flag is invalid.

Action: The privilege flag must be Y or N.

46646, specified Agent name %s was not found

Cause: Invalid Agent name was specified.

Action: Specify a valid Agent name.

B.2 Audit Vault Client Error Messages

This section describes the Oracle Audit Vault client error messages.

B.2.1 General Error Messages

This section describes the general error messages.

46800, Normal, successful completion

Cause: Normal exit.

Action: None.

46801, Out of memory

Cause: The process ran out of memory.

Action: Increase the amount of memory on the system.

B.2.2 CSDK Error Messages

This section describes the CSDK error messages.

46821, generic CSDK error (line %d)

Cause: There was a generic error in CSDK.

Action: Contact Oracle Support Services.

46822, no collector details for collector %s

Cause: Collector is not properly set up in AV tables.

Action: Configure collector.

46823, attribute %s is not valid for category

Cause: Collector attempted to set invalid attribute.

Action: Contact collector owner.

46824, type is not valid for attribute %s

Cause: Collector attempted to set value of wrong type to attribute.

Action: Contact collector owner.

46825, invalid record

Cause: Collector attempted to pass invalid record.

Action: Contact collector owner.

46826, invalid parameter %s (line %d)

Cause: Collector attempted to pass invalid parameter.

Action: Contact collector owner.

46827, invalid context

Cause: Collector attempted to pass invalid context.

Action: Contact collector owner.

46828, OCI layer error %d

Cause: OCI layer returned error.

Action: Contact collector owner.

46829, category %s unknown

Cause: Collector attempted to pass category not configured in AV.

Action: Contact collector owner.

46830, null pointer (line %d)

Cause: Collector attempted to pass null pointer.

Action: Contact collector owner.

46831, invalid source event id (%s)

Cause: Collector passed source event id not suitable for category.

Action: Contact collector owner.

46832, internal error (line %d)

Cause: Internal error occurred in CSDK.

Action: Contact Oracle Support Services.

46833, invalid error record

Cause: Collector attempted to pass invalid error record.

Action: Contact collector owner.

46834, missing attribute in error record

Cause: One or more attributes of error record is missing.

Action: Contact collector owner.

46835, duplicate error attribute

Cause: Collector attempted to set already set attribute.

Action: Contact collector owner.

46836, error record in use

Cause: Attempt to create a new error record before sending or dropping the previous one.

Action: Contact collector owner.

46837, missing eventid attribute in audit record

Cause: Eventid attributes of audit record is missing.

Action: Contact collector owner.

46838, Internal Error: Failed to insert %s into %s hash table

Cause: Core hash table insertion function failed.

Action: Contact collector owner.

B.2.3 OSAUD Collector Error Messages

This section describes the OSAUD collector error messages.

46901, internal error, %s

Cause: There was a generic internal exception for OS Audit Collector.

Action: Contact Oracle Support Services.

46902, process could not be started, incorrect arguments

Cause: Wrong number of arguments or invalid syntax used.

Action: Please verify that all the required arguments are provided. The required arguments are Host name, Source name, Collector name, and the Command.

46903, process could not be started, operating system error

Cause: The process could not be spawned because of an operating system error.

Action: Please consult the log file for detailed operating system error.

46904, collector %s already running for source %s

Cause: Collector specified was already running.

Action: Provide a different collector or source name.

46905, collector %s for source %s does not exist

Cause: Collector specified was not running.

Action: Provide a different collector or source name.

46906, could not start collector %s for source %s, reached maximum limit

Cause: No more collectors could be started for the given source.

Action: None.

46907, could not start collector %s for source %s, configuration error

Cause: Some collector parameters were not configured correctly.

Action: Check the configuration parameters added during ADD_COLLECTOR.

46908, could not start collector %s for source %s, directory access error for %s

Cause: Access to specified directory was denied.

Action: Verify the path is correct and the collector has read permissions on the specified directory.

46909, could not start collector %s for source %s, internal error: [%s], [%d]

Cause: An internal error occurred while starting the collector.

Action: Contact Oracle Support Services.

46910, error processing collector %s for source %s, directory access error for %s

Cause: Access to specified directory was denied.

Action: Verify the path is correct and the collector has read permissions on the specified directory.

46911, error processing collector %s for source %s, internal error: [%s], [%d]

Cause: An internal error occurred while processing the collector.

Action: Contact Oracle Support Services.

46912, could not stop collector %s for source %s

Cause: An error occurred while closing the collector.

Action: None.

46913, error in recovery of collector %s for source %s: %s

Cause: An error occurred while accessing the file.

Action: Verify the path is correct and the collector has read permissions on the specified directory.

46914, error in recovery of collector %s for source %s, internal error: [%s], [%d]

Cause: An internal error occurred while getting recovery information for collector.

Action: Contact Oracle Support Services.

46915, error in parsing of collector %s for source %s: %s

Cause: An error occurred while accessing the file.

Action: Verify the path is correct and the collector has read permissions on the specified directory.

46916, error in parsing of collector %s for source %s, internal error [%s], [%d]

Cause: An internal error occurred while parsing data for collector.

Action: Contact Oracle Support Services.

46917, error processing request, collector not running

Cause: OS Audit Collector was not running and a command was issued.

Action: Start the collector using command START.

46918, could not process the command; invalid command

Cause: An invalid value was passed to the command argument.

Action: Please verify that a valid value is passed to command argument. The valid values are `START`, `STOP` and `METRIC`.

46919, error processing METRIC command; command is not in the required format

Cause: METRIC command was not in the required METRIC:XYZ format.

Action: Please verify that the metric passed is in METRIC:XYZ format where XYZ is the type of metric (Example: METRIC:ISALIVE).

46920, could not start collector %s for source %s, directory or file name %s is too long

Cause: The name of directory or file was too long.

Action: Verify the length of the path is less than the system-allowed limit.

46921, error processing collector %s for source %s, directory or file name %s is too long

Cause: The name of directory or file was too long.

Action: Verify the length of the path is less than the system-allowed limit.

46922, could not start collector %s for source %s, cannot open Windows event log

Cause: Windows event log could not be opened.

Action: Verify event log exists.

46923, OCI error encountered for source database %s access, audit trail cleanup support disabled.

Cause: An error was encountered while attempting to connect to or execute SQL statements on the source database.

Action: Verify source database and listener are up and connect information is correct.

46924, Corrupted recovery information detected for collector %s for source %s

Cause: Corrupted recovery information detected.

Action: Contact Oracle Support Services.

46925, error in parsing XML file %s for collector %s and source database %s : error code %u.

Cause: An internal error occurred while parsing data for collector.

Action: Verify that collector has read permissions on the file and the file is in proper XML format. Contact Oracle Support Services for patch set.

46926, error in recovery of XML file %s for collector %s and source database %s : error code %u.

Cause: An internal error has occurred while parsing data for collector.

Action: Verify that collector has read permissions on the file and the file is in proper XML format. Contact Oracle Support Services for patch set.

46927, Syslog is not configured or error in getting audit files path for syslog for collector %s and source database %s.

Cause: One of the following occurred:

- `facility.priority` was not valid.
- There was no corresponding path for `facility.priority` setting.
- Source database was only returning facility and there was no corresponding path for `facility.*` setting.

Action: Configure syslog auditing to a valid `facility.priority` setting and corresponding valid path. If source database only returning the facility, then contact Oracle Support Services for patch set.

46928, Collector %s for source %s cannot read complete file %s

Cause: File size is more than 2GB.

Action: File size should be less than 2GB. Please use log rotation to limit the file size to less then 2GB.

B.2.4 DBAUD Collector Error Messages

This section describes the DBAUD collector error messages.

46941, internal error, on line %d in file ZAAC.C, additional information %d

Cause: There was a generic internal exception for AUD$ Audit Collector.

Action: Contact Oracle Support Services.

46942, invalid AUD Collector context

Cause: The AUD Collector context passed to collector was invalid.

Action: Make sure that context passed is the context returned by ZAAC_START.

46943, NULL AUD Collector context

Cause: The pointer to AUD Collector context passed to Collector was NULL.

Action: Make sure that context passed is the context returned by ZAAC_START.

46944, conversion error in column %s for <%s>

Cause: The VARCHAR retrieved from `AUD$` or `FGA_LOG$` table could not be converted to ub4.

Action: Correct value in source database.

46945, bad recovery record

Cause: The recovery record retrieved from Audit Vault was damaged.

Action: None. The record will be corrected automatically.

46946, too many active sessions

Cause: The number of active sessions exceeded the specified number in the GV$PARAMETER table.

Action: Contact Oracle Support Services.

46947, CSDK layer error

Cause: CSDK layer returned error indication.

Action: Action should be specified in CSDK error report.

46948, already stopped

Cause: AUD collector already stopped because of previous fatal error.

Action: Restart Collector.

46949, log level

Cause: Specified log level was invalid.

Action: Use a legal log level (1,2,3).

46950, log file

Cause: An error occurred during the opening of the log file.

Action: Make sure that the log directory exists, and that the directory and log file are writable.

46951, bad value for AUD collector attribute

Cause: Specified collector attribute was invalid.

Action: Correct the attribute value in the Audit Vault table AV$ATTRVALUE.

46952, bad name for AUD collector metric

Cause: The specified metric name was undefined.

Action: Use a correct metric name.

46953, unsupported version

Cause: The specified version of the source database is not supported.

Action: Update to supported version.

46954, recovery context of 10.x

Cause: Source database (9.x) was incompatible with 10.x recovery context.

Action: Clean up AUD$ and FGA_LOG$ tables and recovery context.

46955, recovery context of 9.x

Cause: Source database (10.x) was incompatible with 9.x recovery context.

Action: Clean up AUD$ and FGA_LOG$ tables and recovery context.

46956, FGA_LOG$ table of 9.x

Cause: Source database (10.x) was incompatible with 9.x rows of FGA_LOG$.

Action: Clean up FGA_LOG$ table.

46957, RAC recovery context

Cause: Non-RAC source database was incompatible with RAC recovery context.

Action: Clean up `AUD$` and `FGA_LOG$` tables and recovery context.

46958, Non-RAC recovery context

Cause: RAC source database was incompatible with non-RAC recovery context

Action: Clean up `AUD$` and `FGA_LOG$` tables and recovery context.

46959, bad authentication information

Cause: Incorrect format of authentication information in the column COMMENT$TEXT.

Action: Contact Oracle Support Services.

46960, bad metric request

Cause: Unknown metric name (%s) was provided in metric request.

Action: Contact Oracle Support Services.

46961, internal error, on line %d in file ZAAC.C, additional info |%s|

Cause: There was a generic internal exception for AUD$ Audit Collector.

Action: Contact Oracle Support Services.

46962, Database Vault audit table is not accessible

Cause: Database Vault was not set up properly or proper role was not granted to user used by collector.

Action: Set up Database Vault and make sure that `DVSYS.AUDIT_TRAIL$` is accessible to the user used by collector.

46963, Some rows may have been missed by Audit Vault or may be duplicated

Cause: Collector encountered rows in the `SYS.AUD$` or `FGA_LOG$` tables with SESSIONID <= 0.

Action: Contact Oracle Support Services.

Glossary

alert

An indicator signifying that a particular metric condition has been encountered. An alert is triggered when one of the following conditions is true:

- A metric threshold is reached.
- The availability of a monitored service changes. For example, the availability of the host changes from up to down.
- A metric-specific condition occurs. For example, an alert is triggered whenever an error message is written to a database alert log file.

alert rule

A rule in an audit policy setting that specifies an audit condition or other abnormal condition that causes an alert to be raised. An alert rule is based on the data in a single audit record.

audit data source

The database instance running on a computer. Because multiple instances of databases can run on the same computer, there may be multiple sources.

The audit data source consists of databases, applications, or systems that generate audit data. For the current release of Oracle Audit Vault, audit data sources are the following products:

- Oracle Database instances
- Microsoft SQL Server instances
- Sybase ASE instances
- IBM DB2 instances

These databases can run on the same or different computers, and potentially giving rise to multiple sources on the same system. Audit data from audit sources represents a variety of audit formats. Each audit source is categorized by its source type, which represents a class of audit sources. For example, Oracle Database audit sources with the same audit formats, audit events, and collection mechanisms represent an audit source type. Table 1–4 on page 1-4 lists the collectors that are associated with these database products.

See also **DB2DB collector**, **DBAUD collector**, **MSSQLDB collector**, **OSAUD collector**; **REDO collector**; and **SYBDB collector**.

audit data warehouse

A data store that stores within Oracle Audit Vault a translated or processed set of audit data from the raw audit data store that is of interest to audit administrators for data analysis and from which administrative and custom reports can be generated.

See also **data warehouse**.

audit rule

A rule in a audit setting that specifies the action to be audited, for example, a logon attempt or a user accessing a table.

audit setting

A set of rules that specifies what audit events should be collected in Audit Vault, and how each audit event should be evaluated after it is inserted into the raw audit data store. The types of rules in an audit setting include alert rules, audit rules, and capture rules. An audit setting can be composed of two or more sets of rules known as a **composite audit setting**.

See also **alert rule**; **audit rule**; and **capture rule**.

Audit Vault administrator user

A user granted the `AV_ADMIN` role. This user configures and manages collectors, collection agents, and warehouse settings and scheduling. This user also configures sources, enables and disables systemwide alerts, views audit event categories, and monitors audit errors.

Audit Vault agent user

A user granted the `AV_AGENT` role. This user is created prior to an Oracle Audit Vault collection agent installation. This user must be created before a collection agent is added to Audit Vault and before a collection agent is initialized.

Audit Vault archive user

A user granted the `AV_ARCHIVER` role. This is an internal user role used to run back-end archiving jobs.

Audit Vault auditor user

A user granted the `AV_AUDITOR` role. This user monitors audit event categories for alert activity to detect security risks, creates detail and summary reports of events across systems, and manages the reports. This user also manages audit policies that include creating alerts and evaluating alert scenarios, and managing audit settings. This user can use the data warehouse services to further analyze the audit data to assist in looking for trends, intrusions, anomalies, and other items of interest.

Audit Vault Configuration Assistant (AVCA)

See **AVCA**.

Audit Vault Control (AVCTL)

See **AVCTL**.

Audit Vault Microsoft SQL Server Database (AVMSSQLDB)

See **AVMSSQLDB**.

Audit Vault Oracle Database (AVORCLDB)

See **AVORCLDB**.

Audit Vault Sybase ASE Database (AVSYBDB)

See **AVSYBDB**.

Audit Vault source user

A user granted the `AV_SOURCE` role. This user is automatically created when a source is registered (added) to Audit Vault. This user is used to connect to the source and to set up the source's collectors.

AVCA

Audit Vault Configuration Assistant. A command-line utility that enables the Audit Vault administrator to manage various Oracle Audit Vault components, manage collection agents (add/alter/drop), secure communication between the Audit Vault Server and Audit Vault collection agent, set warehouse scheduling and audit data retention settings, and as needed create a wallet and certificates on the collection agent.

AVCTL

Audit Vault Control. A command-line utility that enables the Audit Vault administrator granted the `AV_ADMIN` role to manage Audit Vault components, such as collection agents (start/stop/show status), collectors (start/stop/show status), Audit Vault Console (start/stop), and OC4J (start/stop).

AVMSSQLDB

Audit Vault Microsoft SQL Server Database. A command-line utility that provides the ability to configure sources (add/alter/drop), configure collectors (add/alter/drop), and verify that the source is compatible with its collector, and setup the source user credentials and database alias for the source user in the wallet and verify the connection to the source using the wallet.

AVORCLDB

Audit Vault Oracle Database. A command-line utility that provides the ability to configure sources (add/alter/drop), configure collectors (add/alter/drop), verify that the source is compatible with its collector, and setup the source user credentials and database alias for the source user in the wallet and verify the connection to the source using the wallet.

AVSYBDB

Oracle Audit Vault Sybase ASE Database. A command-line utility that provides the ability to configure sources (add/alter/drop), configure collectors (add/alter/drop), and verify that the source is compatible with its collector, and setup the source user credentials and database alias for the source user in the wallet and verify the connection to the source using the wallet.

capture rule

A rule in an audit policy setting that specifies an audit event that is sent to Audit Vault.

certificate

A digitally signed statement by a Certificate Authority (CA), saying that the identity of an entity is certified in some way. When an entity requests certification, the CA verifies its identity and grants a certificate, which is signed with the CA's private key. A digitally signed certificate is verified to have been checked for data integrity and authenticity, where integrity means that data has not been modified or tampered with, and authenticity means data indeed comes from the entity claiming to have created and signed it.

A digital identification of an entity that contains the following:

- SSL public key of the server
- Information about the server
- Expiration date
- Digital signature by the issuer of the certificate, used to verify the authenticity of the certificate

collection agent

A process within which collectors run. A collection agent sets up the connection between the collector and the audit service and interacts with the management service to manage and monitor collectors. An example of a collection agent is the Oracle collection agent within which run the collectors for Oracle Database OS audit logs (OSAUD).

collector

A component that collects audit data for a source and sends the audit records to Audit Vault. Audit Vault uses the DBAUD collector, OSAUD collector for OS files, OSAUD collector for Windows event logs, and REDO collector to collect Oracle Database logical change records (LCRs) from redo logs; the MSSQLDB collector to collect audit data from Microsoft SQL Server database audit trails; and the SYBDB collector to collect audit records from Sybase ASE database audit trail.

See also **DB2DB collector**, **DBAUD collector**, **MSSQLDB collector**, **OSAUD collector**; **REDO collector**; **SYBDB collector**; and **DB2DB collector**.

composite audit setting

See **audit setting**.

configuration data

The Audit Vault metadata stored within Audit Vault that describes how to process and control the audit data as it passes through the Audit Vault system.

data warehouse

A relational database that is designed for query and analysis rather than transaction processing. A data warehouse usually contains historical data that is derived from transaction data, but it can include data from other sources. It separates analysis workload from transaction workload and enables a business to consolidate data from several sources.

See also **audit data warehouse**.

DB2DB collector

IBM DB2 audit log collector. This collector extracts and collects IBM DB2 (releases 8 and 9.5) audit records from the audit trail logged in the ASCII text files generated by the source database. The DB2DB collector belongs to the DB2DB collector type.

DBAUD collector

Oracle Database DB audit log collector. This collector converts Oracle Database `SYS.AUD$` table rows and Oracle Database Vault audit trail `DVSYS.AUDIT_TRAIL$` table rows into audit records. The DBAUD collector belongs to the ORCLDB_DBAUD collector type.

digital certificate

See **certificate**.

fact table

A table in a star schema that contains facts. A fact table typically has two types of columns: those that contain facts and those that are foreign keys to dimension tables. The primary key of a fact table is usually a composite key that is made up of all of its foreign keys.

A fact table might contain either detail level facts or facts that have been aggregated (fact tables that contain aggregated facts are often instead called summary tables). A fact table usually contains facts with the same level of aggregation.

Hypertext Transmission Protocol, Secure

See **HTTPS**.

HTTPS

Hypertext Transmission Protocol, Secure. The use of Secure Sockets Layer (SSL) as a sublayer under the regular HTTP application layer.

key store

A repository that includes the following:

- Certificates identifying trusted entities. When a key store contains only certificates of trusted entities, it can be called a trust store.
- Private-key and the matching certificate. This certificate is sent as a response to SSL authentication challenges.

keytool

A key and certificate management utility used by Audit Vault located at $ORACLE_HOME/jdk/bin/keytool for generating the key store. With a key store and certificate in place at the Audit Vault collection agent, an Audit Vault administrator can issue an `AVCA secure_av` command on the Audit Vault Server to secure Audit Vault communications by enabling mutual authentication with the Audit Vault collection agent. Likewise, an Audit Vault administrator can issue an `AVCA secure_agent` command to enable mutual authentication with Audit Vault Server. This utility enables users to self-authenticate by administering their own public/private key pairs and associated certificates or data integrity and authentication services, using digital signatures.

LCR

A logical change record. This is a message with a specific format that describes a database change.

logical change record (LCR)

See **LCR**.

mapping

The definition of the relationship and data flow between source and target objects.

metric

Unit of measurement used to report the health of the system.

MSSQLDB collector

Microsoft SQL Server Database audit log collector. This collector extracts and collects Microsoft SQL Server Database (SQL Server 2000 and SQL Server 2005) (for Windows platforms) audit records from the Windows Event logs, Server-side Traces, and C2 auditing logs. The MSSQLDB collector belongs to the MSSQLDB collector type.

Oracle Database DB audit logs collector (DBAUD)

See **DBAUD collector**.

Oracle Database OS audit logs collector (OSAUD)

See **OSAUD collector**.

Oracle Database redo logs collector (REDO)

See **REDO collector**.

OSAUD collector

Oracle Database OS audit log collector. This collector parses operating system (OS) log file entries into audit records. The OSAUD collector belongs to the ORCLDB_OSAUD collector type.

On Windows, the OS audit trail is the Windows event log if the `AUDIT_TRAIL` parameter is set to `OS`, or an XML file if the `AUDIT_TRAIL` parameter is set to XML. The OSAUD collector will automatically extract and collect audit records from either audit trail.

PKI

A public key infrastructure. This information security technology uses the principles of public key cryptography. Public key cryptography involves encrypting and decrypting information using a shared public and private key pair. It provides for secure, private communications within a private network.

public key infrastructure

See **PKI**.

raw audit data store

The sole repository of Audit Vault. It stores unprocessed audit data in partitioned tables based on time stamp, and in unpartitioned tables based on source ID.

REDO collector

Oracle Database redo log collector. This collector translates logical change records (LCRs) into audit records. The REDO collector belongs to the ORCLDB_REDO collector type.

secure audit warehouse

A data warehouse with greatly reduced Administrator user role access. It contains Audit Vault audit data for query and analysis.

silos

Traditionally, a tall, cylindrical tower used to store grain or fodder on a farm. In information management, a silo system is vertical, isolated, independent, and incapable of reciprocal operations with other, related management systems. The result of this independence and isolation is that multiple versions of the same data are stored.

star schema

A relational schema whose design represents a multidimensional data model. The star schema consists of one or more fact tables and one or more dimension tables that are related through foreign keys.

SYBDB collector

Sybase ASE Database audit log collector. This collector extracts and collects Sybase ASE (ASE 12.5.4 and ASE 15.0.2) audit records from the audit trail logged in audit tables in the sybsecurity database. The SYBDB collector belongs to the SYBDB collector type.

trust store

See key store.

X.509

A widely used standard for defining digital certificates. X.509 defines a standard certificate format for public key certificates and certificate validation.

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